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OBSERVATIONS ON THE DEVELOPMENT AND FUNCTION OF THE ENAMEL ORGAN*

By NEWTON G. THOMAS, M.A., D.D.S., Chicago, Illinois

THE embryology of the enamel organ needs investigation. Asservations that are largely assumptive are of frequent occurrence in the literature. Disagreements occur because hypotheses have not been supported by inquiry. Often, the disagreements are the result of failure to recognize variation as a law of development and growth. In other instances, they are the sequel of a too great confidence in early publications. At times, they follow a pedagogic theory employed by many teachers that subject matter must first be formulated, aphorized for student convenience, with the result that the student seldom understands the real structural variations. Exceptions and corrections may be made later. A look at the schematic illustrations used to picture the forming enamel organ clarifies the point (Figs. 1, 2, 3 and 4). One wonders what the general concept of the process of development in the mind of the author is when one sees how inadequate the sketches are to clarify the process they are devised to aid. Obviously, nothing ever occurs in Nature like them; they mislead, and what they imply must be undone in detail. That widest deviation from their signification takes place is a daily laboratory observation. Work is needed on this old and interesting subject for the establishment of some of the facts of development and the erasure of many errors that are current.

The observations recorded here were made on human tissues as well as on tissues of the dog, cat, sheep and pig. Much human material was made available to the study through the kindness of Dr. George Bartelmez of the Department of Anatomy of the University of Chicago. Figure 6 presents a specimen in his

*From the Department of Anatomy, University of Illinois, College of Dentistry.

collection. The remainder is entirely from the histology laboratory of the College of Dentistry of the University of Illinois. Also, it should be stated that this study is made more in confirmation of the original statement that research in this field is needed than it is to present a description of established processes.

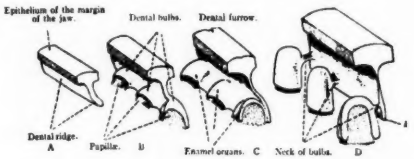


Fig. 1.—This, with Figures 2, 3 and 4, represents schematic drawings showing enamel organ development taken from texts ranging in dates from 1879-1922.

The dental ridge, the mound of cells along the jaws over the line of dental formation and the labiodental groove are usually emphasized as the necessary

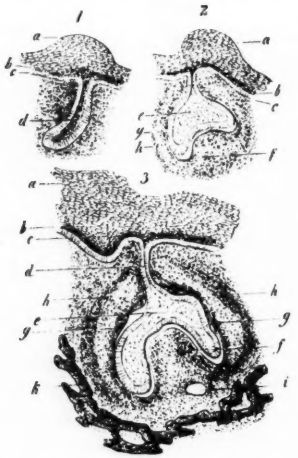


Fig. 2.—This, with Figures 1, 3 and 4, shows enamel organ development as pictured in texts, 1879-1922.

precursors of the enamel organ. In the examination of the human embryos in the anatomy laboratory of the University of Chicago, I first observed that, with more than accidental regularity, the ridge was absent. A close examination of the surface cells over the anlage showed that they differed none from those medial or lateral to the anlage. There had been no washing of the cells to reduce the ridge. The preparative process had made this next to impossible, as the double imbedding method of Guild had been used. When the ridge was in evidence, it seemed to be more the result of folding of the tissues as a whole than of actual proliferation. The increase of developing jaw tissues with the consequent pressures that must follow may easily be responsible for numerous variations. When the dental groove and the lip groove were separate, the ridge was conspicuously absent. Examination of other animals followed, with similar results. The heap of cells was lacking with impressive frequency, particularly as above, when the two grooves were disparate or when the tooth groove was forming alone. The labiodental groove is made of entities often too widely separate in oral construction to justify the use of the term without qualification. It is anatomically incorrect, and therefore misleading. This supports the findings of Leche,[1] who stated that the tooth band and the *lippenfurche* have both common and independent origins. The dental groove caused by the ingrowth of the basal epithelium is the first constant preliminary to enamel formation.

1. Leche: Morph. Jahrbuch, 1892.

The dental band, or lamina, is a most variable structure. Figures 1, 2, 3 and 4 are often used to depict the processes of development, but they fall embarassingly short of showing what actually occurs. Neither is the situation assuaged by saying such schematic representations meet a pedagogic need. There is scarcely a defense for any portrayals that mislead, abound in inaccuracies and give false ideas of the whole biologic concept. These artifices present the burrowing column of cells perpendicular to the oral surface, and, as a usual procedure, it is discussed as though it were the sole determinant of its directional destiny.

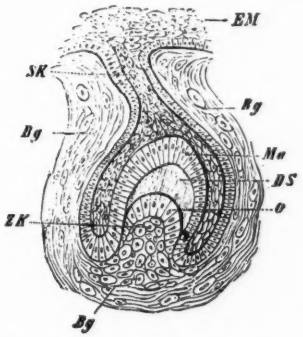


Fig. 3.—This, with Figures 1, 2 and 4, shows enamel organ development as pictured in texts, 1879-1922.

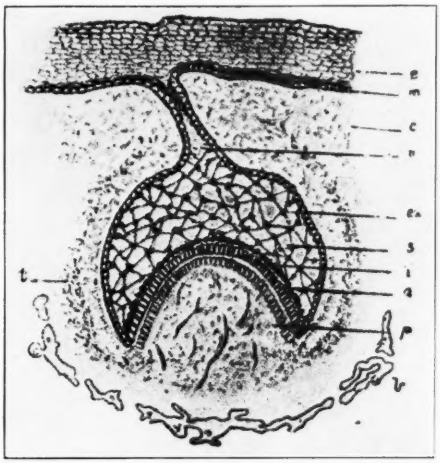


Fig. 4.—This, with Figures 1, 2 and 3, shows enamel organ development as pictured in texts, 1879-1922.

The fact that the total environment of this flexible, labile structure is in a surge of activity seems lost to consideration. That a wide deviation from these outlined prescriptions occurs is indicated by a line from a reputable text: "On the lingual side of the structure the epidermal cells grow out forming a layer projecting as far as the ridge itself. The new growth is first nearly at right angles to the axis of the ridge. This is the dental lamina."[2] This statement is based upon a nomenclature that includes the whole structure shown by *a* in Figure 2, as the dental ridge. With this assertion so clearly made, the same text shows an enamel organ expanding from the terminus of the perpendicular ridge as well. It is evidently possible to have an enamel organ develop from the end of the ridge without a lamina.

It appears not only convenient but necessary at this point to develop a consistent nomenclature for the subsequent discussion. When a heaping of cells occurs around the arches, "dental ridge" becomes an appropriate usage. Commonly, the basal cells of the oral epithelium at the point of ingress to the mesenchyme forms a groove, for which the term dental groove seems satisfactory. From the bottom of this groove, the two-layered column of basal cells

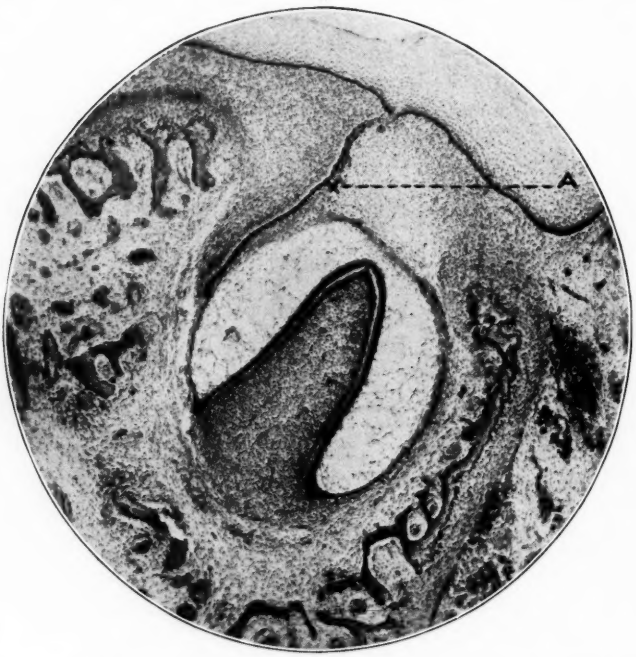


Fig. 5.—Enamel organ showing absence of straining propensity on either medial or lateral side of outer tunic; the band growing along the enamel organ, with tendency of band to bud on lateral side at *A*.

2. Noyes, F. B.: A Text-book of Dental Histology and Embryology, Ed. 3, London, Henry Klimpton, 1921.

forms a curtain, which is said to be "continuous along the entire extent of the ridge"[3] (Figs. 1 and 2). Le Gros and Magitot[4] call the whole structure "ridge," and say it is continuous, although exception is taken to the name. To call it the dental band would waive much difficulty in description. A lingual development from either the apex that a lamina might be absent, the tooth germ proper expanding from the end of the band (Figs. 2, 3, 4 and 5). Another common mode of development seen in all the animals studied is a direct formation of an enamel organ from the basal cell layer (Figs. 6 and 7). In such instances, the stellate reticulum of the tooth germ becomes continuous with

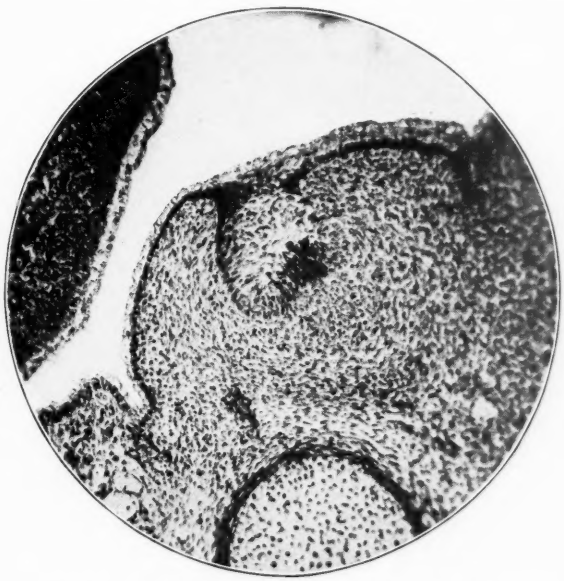


Fig. 6.—Developing tooth germs of human fetus, demonstrating absence of heaped cells over the anlage, the continuity of stellate reticulum and oral epithelium and immediate budding of germ form, basal-cell layer, oral epithelium; disparate dental and lip grooves; *Schmelzknoten* present.

of the dental groove or the terminus of the band might be termed the dental lamina, without objection. This terminology will be employed through the remainder of this article.

Previous to the paragraph on nomenclature, it was seen that a lamina might appear from the apex of the groove and the polygonal cell forms of the oral epithelium. Obviously, there is no band or lamina, but a constricted necklike attachment, which develops with the expansion of the germ and the growth of the connective tissues. It might be suspected that the observer is deceived by a pseudo-enamel organ, an accidental shaping of the dental and lip grooves in combination, but the reticular cell formation as well as the ameloblastic

3. Footnote 2, p. 322.

4. Le Gros and Magitot: The Dental Follicle, 1879, (trans. by Dean).

preparation of the inner tunic are unmistakable. For teaching purposes, it has been suggested that the variations be referred to as are Golgi's cells by types, but it seems a better plan to emphasize the possible variation as illustrative of the mutations to be expected in the study of living tissues.

The relation of the enamel organ buds, both temporary and permanent, has given rise to statements that contradict, while bits of dogmatism are scattered through the literature that are woefully strange in scientific writings. Sudduth[5] says the germs of the temporary teeth bud from the margin of the lingually extended lamina, and he illustrates, in part, with a tooth germ well developed at the terminus of its band, with decided labial inclination. The same writer says that the germs of the permanent teeth spring from the outer tunic or somewhere along the cord. With this, Noyes accords. Tomes,[6] Mummery,[7] and Hopewell-Smith[8] say that the temporary germ springs from the lingual surface of the ridge (band), explaining further than the band continues past the temporary germ to give rise to the permanent tooth, in turn (Tomes,[6] Mummery[7]). To emphasize one related item, Hopewell-Smith says the permanent germ never arises from the neck of the enamel organ, adding "Röse has proved this fact beyond a doubt." Kingsley,[8] however, interprets Röse with a drawing showing the exact opposite of Hopewell-Smith's statement. With the publication of "The Dental Follicle,"

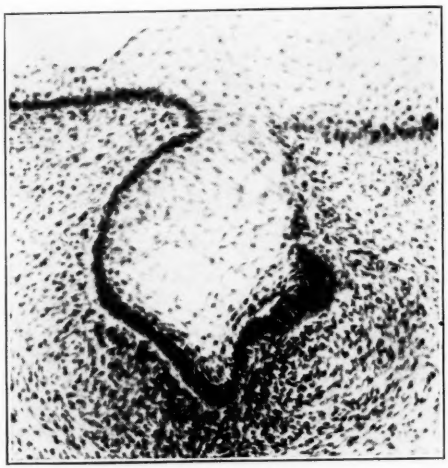


Fig. 7.—Enamel organ of pig, budding directly from basal cells of oral epithelium; stellate reticulum continuous with polygonal cells of surface tissues.

5. Sudduth: The American System of Dentistry, 1886.

6. Tomes, J.: Dental Surgery, 1873.

7. Mummery, J. H.: Microscopic Anatomy of the Teeth, London, Henry Frowde, 1920.

8. Hopewell-Smith, A.: Normal and Pathological Histology of the Mouth, Ed. 2, Philadelphia, P. Blakiston's Son and Company, 1918.

8. Kingsley: Comparative Anatomy of Vertebrates, Ed. 2, 1907.

G. V. Black made an investigation of this subject, which was never published. He concluded that a permanent tooth germ might arise either from the outer tunic of the primary tooth germ, the tooth band or the oral epithelium directly. It is deserving of mention that the figures used by Dean in making the translation are the products of Dr. Black's hand. It is obvious that the temporary germ may develop terminally with respect to the band, the appearance of the permanent germ being somewhat subject to other factors.

A study of the figures makes the dilemma a little less difficult. When the germ of the temporary tooth begins to develop to the lingual of the band, as seen in Figure 5, the progression of the band past it is clear. When the germ of the primary dentition expands from the terminus of the band, two possibilities occur. With the growth of the jaw tissues, it is possible for the temporary germ to be carried to such a position that the band will be tangential to the convex outer tunic, as shown in Figure

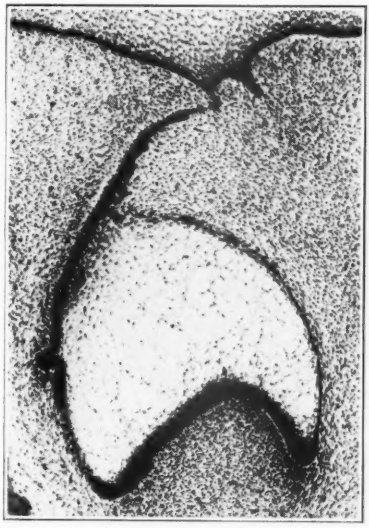


Fig. 8.—Enamel organ showing deep staining proclivity of cells on medial side of tunic and band as well as the emaciation of outer tunic on lateral surface. A medial bud protrudes from the outer tunic for permanent germ.

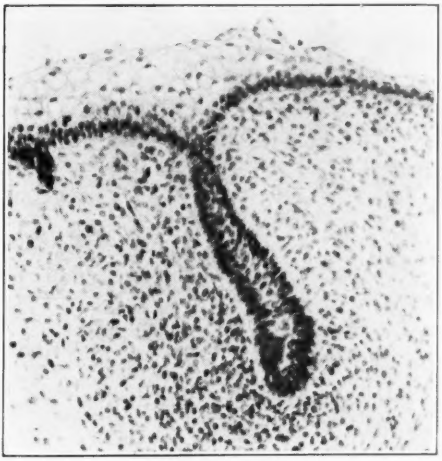


Fig. 9.—Epithelial growth making an all but direct descent into the mesenchyme; mitosis abundant in both layers of cells.

5; or the outer tunic may bud at some point to this end (Fig. 8). Judging from the stage to which some temporary tooth germs advance before any budding or advance of the band takes place, it is apparent that often the ongrowth of the band is delayed so long that, when progress is again resumed, the outer tunic is the only origin available unless the permanent germ should come from the oral epithelium directly. I have never seen positive evidence of the latter although I do not question the possibility. Figure 8 might readily be interpreted as showing a permanent enamel organ anlage arising from the outer tunic.

The least probable origin is the dental band, except at its end. Because of its tendency to bud (Fig. 5*A*), it has been suspected as the possible origin of supernumerary teeth. This is a highly improbable hypothesis, although the prolixity of all the dental epithelium is well nigh unlimited. The general plan of development followed in all preceding forms, speaking phylogenetically, is the extension of the band beyond the temporary germ for the formation of the second dentition. Doubtless, this is the most persistent and dependable procedure pursued in all mammals, the other methods being sporadic and accidental.

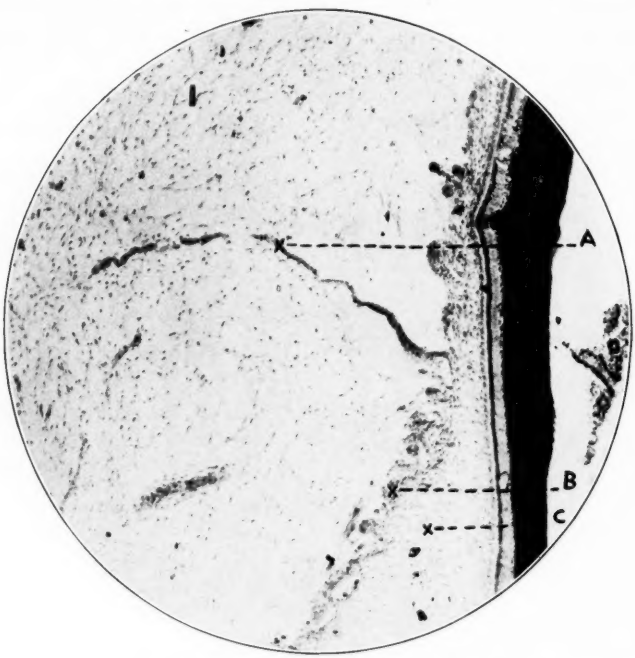


Fig. 10.—Human incisor at birth; *A*, epithelial cord growing from outer tunic; *B*, outer tunic; *C*, stellate reticulum.

In this connection, the cellular proliferation and the cellular variation involved in the formation of the enamel organ are conspicuously relevant. Though

the two layers of the invading column of epithelium descending from the apex of the dental groove have exactly similar origins, they do not remain alike for any considerable time. On one side, the cells retain their oral, basal-cell character, the cuboidal form, which the bud will spring as the case presents (Figs. 5 and 8). The band also shows a tendency to budding as mentioned above, a condition that has given rise to the suspicion, mentioned previously, that supernumerary teeth arise here. To date, the suspicion remains merely a suspicion. Strands grow out from it to varying lengths, and in instances the entire band surrenders to this process.

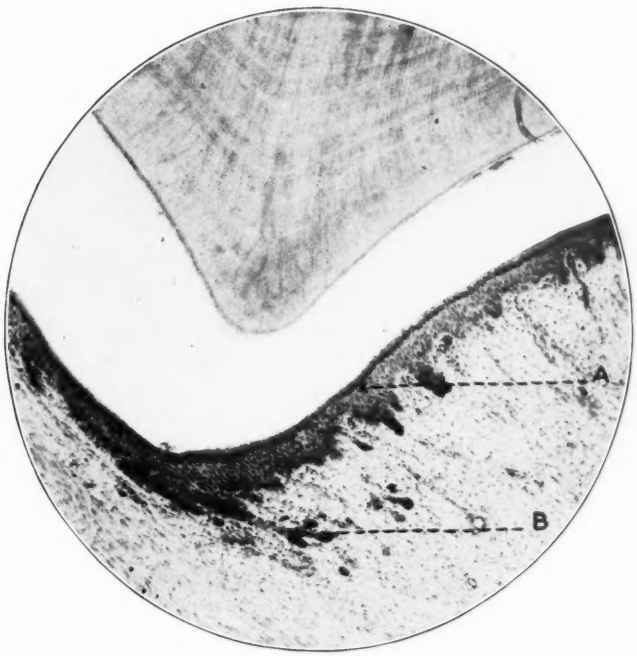


Fig. 11.—Enamel organ over cusp of tooth of dog; *A*, ameloblasts; *B*. profuse budding of epithelium.

wealth of chromatin, and basophilic cytoplasm. The other side loses all these marks of physiologic potency, becoming attenuated, fibrillar, weak in basophilic reaction and, doubtless, incapable of division. This change begins, usually, on the labial or buccal convexity of the enamel organ, extending up the side of the band later. Always, the richly staining, more virile cells are on the side from which the band continues or from

This puzzling activity is also seen in islands around the convexity of the enamel organ, at times as though projections from the band extend over it, showing as isolated groups in cross section. At other times, the entire outer tunic is devoid of any vital character-

istics, and the physiologically active area is confined to the band. During the time that both layers of the band are unchanged from the parent condition of the basal cell layer, mitoses may be seen in either layer (Fig. 9). It is later confined to the lingual side of the band or lamina or the germ, until the enamel organ is separated from the band and the tunics have regained contact. Later, it is seen that activity is resumed everywhere. Figures 10 and 11 show extensive budding late in the developmental history of the tooth. The specimen in Figure 11 is about to erupt.

Very early in the invagination process, the basal cells of the oral epithelium that constitute the inner tunic lose their cuboidal form throughout the whole extent of the tunic, and slightly over the reflexions of the tunic laterally. They become spheroidal and enlarge considerably, during which time mitosis is active. This does not imply that any section of a growing jaw will show cell division; for we know that too many vicissitudes attend tissue preparation for this to be true, and there is as well the evident fact that mitosis is a cyclic occurrence rather than a persistently continuous one. When the phenomenon does occur, it will be found in the areas indicated in the preceding paragraph, and eventually in the inner tunic only. From the cell mass thus developed, the tall cylindrical forms, the ameloblasts, arise. Those remaining external to the ameloblasts will form the stratum intermedium. It will be observed then that the enamel-forming cells are not tall overgrown

Fig. 12.—Mitosis in the stratum intermedium of tooth germ of pig.

cuboidal cells of the oral epithelium, but are rather new developments removed from the basal cells by generations of mitosis. Their nuclei are in the ends opposite to that of their parent cells. From this time on, the stratum intermedium seems to be the only place where mitosis may be expected, and so, from it, will arise the cells that constitute the reticulum and still later the outer tunic. Röse quotes Canalis as saying that mitosis does not occur over the enamel-forming area during secretional activity. Figure 12 contradicts this theory.

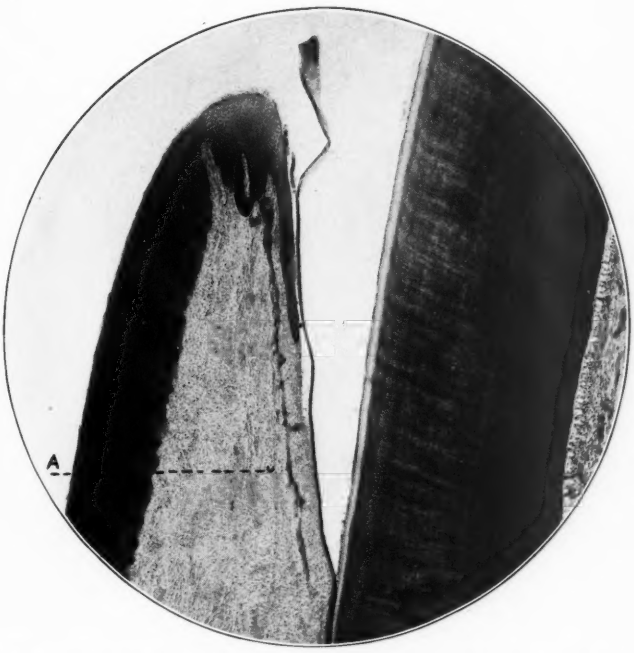


Fig. 13.—Epithelial cord developing from oral epithelium in an adult dog.

With the formation of the ameloblasts, there is intimately associated the formation of the two ameloblastic membranes. The ameloblasts are virtually functional when the membranes appear. Williams,[9] who noted this fact as early as 1896, confessed the difficulty of determining their origination. There can be little question of the source of the outer membrane as its location in a wholly epithelial environment predetermines its origin. The outer membrane offers other complexities, but its limitation to the ameloblastic surface is suggestive, at least, of its relationship to those cells. Both membranes add perplexities to the situation. Their function and cell kinship found in the enamel organ are effected. Since no mitosis has been observed in the ameloblasts themselves after matur-

9. Williams, J. L.: Formation and Suture of Dental Enamel, Dent. Cosmos, 38: 453 (June) 1896.

ity, and it is readily observable in the stratum intermedium, the assumption is that these highly specialized structures are supplied from that source. But the outer membrane adds doubt to that hypothesis, without the assumption of diapedesis, which has never to my knowledge been observed.

istence of the former is easily corroborated as it seems to be common to the mammals used in this study, but the latter was not found in any of the specimens examined. It would seem to be incidental rather than characteristic, another evidence of the versatility of the tissue involved.

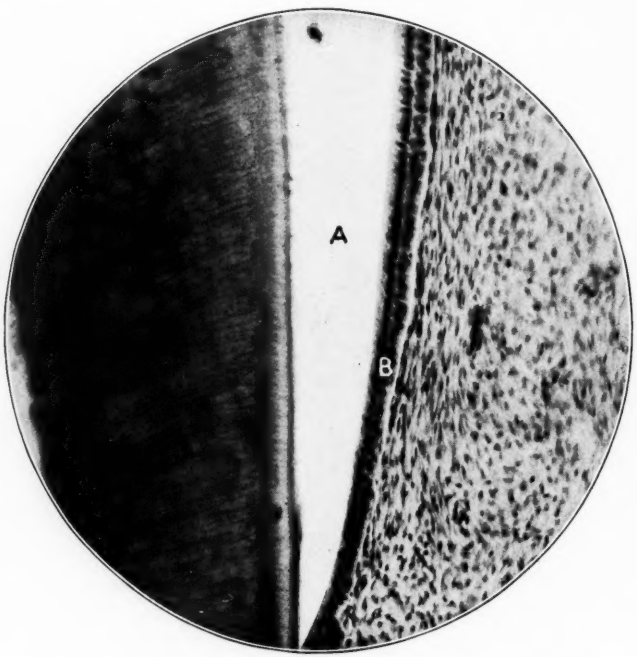


Fig. 14.—Tooth of dog; *A*, gingival space; *B*, columnar epithelium.

Shaffer[10] has described two structural features in the enamel organ that I have sought to confirm. He pictures a cell mass inhabiting the inner tunic, which he designates as the *schmeltzknoten* (Fig. 6). Also, he presents a string of massed cells extending from the vertex of the inner tunic across the stellate reticulum almost halving it. This he terms the *schmeltzstrang*. The ex-

10. Shaffer: Lehrbuch der Histologie und Histogenese, Ed. 2, 1922.

The amazing potentiality of epithelial cells gives rise to the wide variations seen in any study in which they are in question. So the profuse budding over parts of the tunic is not surprising. This phenomenon may be found on the dental germs of any of the animals studied. From these buds, strings of epithelial cells burrow into the surrounding connective tissue. One reference has already been made to this occurrence. They will be seen to arise from the

outer tunic with equal avidity and penetration (Figs. 10 and 11). Probably these sources account for most of the strands of epithelium found in the periodontium. It seems more than probable. Perhaps many of these migrant cells are often absorbed, explaining, it may be, the statement made given, to my knowledge. Thus, four possible origins occur for these expatriated cells, three of which are demonstrated here: the budding tooth band, the budding outer tunic, the gingival epithelium and the epithelial root sheath. Probably, the band and the outer tunic are the commonest sources of supply.

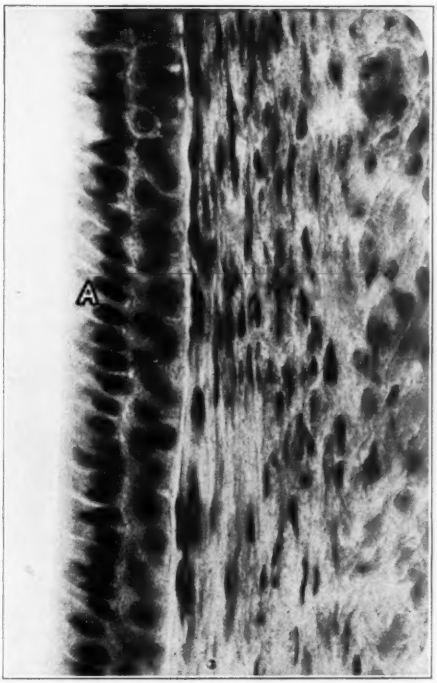


Fig. 15.—High magnification of columnar epithelium lining gingival space; *A*, columnar cells resting on outer ameloblastic membrane.

by Black.[11] Again, they appear as offspring of oral epithelium in adult life, possibly as a result of irritation (Fig. 13). They have been thought to arise perhaps from the remains of the epithelial root sheath of Hertwig, but for this conjecture no proof has been

Such cords in the periodontium have been variously named and described by Malassez,[12] Von Brunn[13] and Black.[14] In pathologic treatises, they have been discussed in their relation to

11. Black, G. V.: Special Dental Pathology. Chicago, Medico-Dental Publishing Co., 1915.

12. Malassez: J. Brit. D.A., 1885.

13. Von Brunn: Archiv. f. Anatomie, 1887.

14. Black, G. V.: Periosteum and Peridental Membrane, 1887.

cysts.[15] That they are normal structures having a definite though unknown function seems beyond question. Their constancy in the membranes of both dentitions of common laboratory mammals and their persistence through life

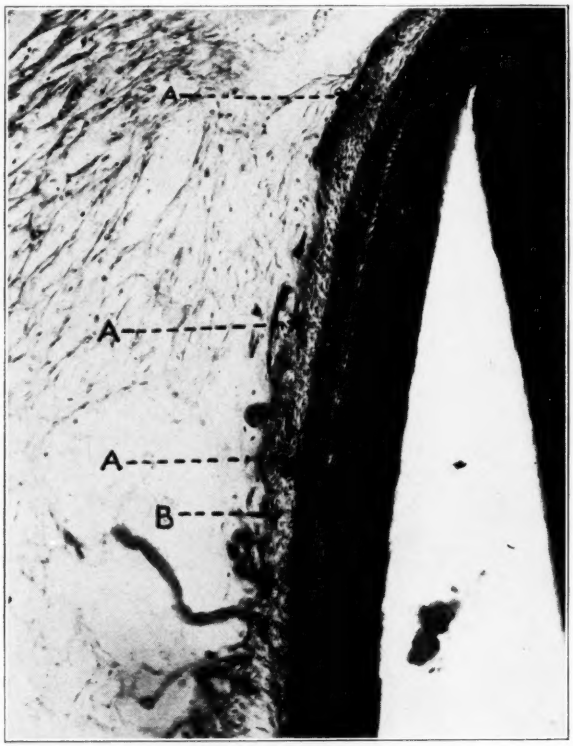


Fig. 16.—Central incisor of child; *A*, capillaries in stellate reticulum; *B*, stellate reticulum. (Mallory's triple connective-tissue stain.)

supports the postulation of their normality. The idea has been submitted that they are stimulative to special cell formation, in cementogenesis, as the root sheath is to the formation of odontoblasts. Discouraging this theory is the wide variation in their numbers and location, as well as the absence of any increase in cementogenic activity when they are most numerous. They often appear in veritable webs, where the reverse is true.

The destiny of the enamel organ is important in this connection. It is frequently indicated in writings and by clinicians that this structure breaks up when amelogenesis is complete, the fragments giving rise to the cords discussed above. Black combated this hypothesis many years ago, saying that he had observed "these cells float away and be absorbed."[11] That budding takes place

15. Dependorf: Deutsch. Monatschr. f. Zahnheilk., 1912.

throughout the preeruption period is evident, as Figure 11 shows a tooth almost in contact with the oral epithelium. The enamel organ is whole and the stratum intermedium is in active gemmation. There is no sign of disruption of the enamel organ. Further, a recent work ascribes Nasmyth's membrane to the "last transformation of the adamantoblasts."[16] The observation asked above shows that no transformation ensues after amelogenesis is complete. Figure 14 pictures the gingival space of a tooth fully erupted and almost in occlusion with a lining of columnar epithelium. Figure 15 is a higher magnification of the same field, showing not only perfectly preserved ameloblasts but also underlying cells formerly constituting the stratum intermedium, as well as the outer ameloblastic membrane lying between. This order is common to all the animals mentioned at the beginning of this article.

The functions of the enamel organ is obviously more than amelogenesis. Its influence in dentinogenesis is impressive even to a casual student. No mesenchymal activity toward tooth development is ever seen without this epithelial activity first; and, throughout the apical extension of tooth growth, no dentinogenetic cells ever appear without a previous extension of the epithelial root sheath. It is obvious, too, that, in eruption, connective tissues would be uncovered to the mouth fluids if the enamel organ did not offer some cover for them. This exigency of eruption is met by the enamel organ, as its terminal function. The part of the structure over the occlusal and incisal surfaces is demolished in the final penetration of the gum tissues, while the axial portions of the structure line the deep gingival space (Figs. 14 and 15). Accordingly, sections made of teeth during their early oral life will show encroachment of the typical oral epithelium over the crest of the newly created gingiva into the gingival space, eventually and speedily displacing the temporary tenants of the space entirely. How long the columnar cells remain there has not been determined, and the point is of negligible interest, for columnar cells are a maladaptation to surfaces when friction or pressure occurs.

Fig. 17.—Central incisor of child showing penetration of outer tunic by capillary.

The wealth of blood supply afforded the functioning enamel organ is impressive. Everywhere around the periphery, but particularly over the actively amelogenic area, gorged capillaries are in evidence. These, in the eagerness of their function, press between the knotted outer tunic or indent it in the absence of the buds that may characterize it. In the early stages of the enamel organ, such as are indicated in the figures shown, the paucity of capillary supply is the noticeable condition. Only as the time of calcification approaches are the

16. Mongiardino: Osservazioni sullo Sviluppo Dei denti nei mammiferi, Cult. Stomatol., 1925.

capillaries to be found, either in the papilla or around the epithelial structure, in such profusion. Much work has been done on the subject of the circulatory supply of the enamel organ and the stellate reticulum, with only varying results. The names associated with this problem are Wedl,[17] Le Gros and Magitot,[4] Poulton,[18] Lekowski,[19] Hopewell-Smith and Tims,[20] Bolk,[21] Carter,[22] Jordan,[23] Addison and Appleton[24] and Kingery.[25] Animals of many kinds have been used, from marsupials to man. Wedl asserts that the enamel organ of the human incisor contains no blood vessels. Jordan is assured that blood vessels do not actually penetrate the enamel organ. In the study of the teeth of rodents, ungulates and primates, Kingery observes that the type of tooth employed is the molar. Evidently, he studied the molar as well. It seems that no observation of recent date has been made of the incisors. The specimen presented here is an incisor of a baby at term (Fig. 16.) Over the incisal area, the vessels in the stellate reticulum are numerous, and, over the lateral surfaces, they are seen to penetrate deeply through the outer tunic into the enamel pulp. Others are cut transversely within the pulp.

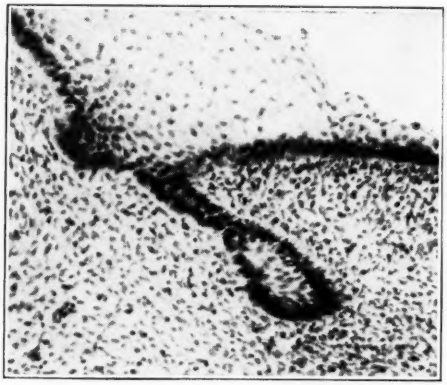


Fig. 18.—Band with a lingual inflection. The germ began in combination with the lip groove.

While Jordan believes that "blood

17. Wedl, Karl: Pathologie der Zaehne, 1870.

18. Poulton: Quart. J. Microscopic Sc.

19. Lekowski, W.: Die Verteilung der Gefässe in den Zähnen des Menschen. Anat. Hefte Beit. Anat. und Entwick, 17: 181-195.

20. Hopewell-Smith and Tims: Proc. Zool. Soc. London.

21. Bolk, L.: Ueber ein Gebiss mit. vaskularisierten Schmelzorganen. Anat. Anz.

22. Carter, J. T.: The Cytomorphosis of the Marsupial Enamel Organ and Its Significance in Relation to the Structure of the Completed Enamel, Phil. Trans. Roy. Soc. London, 1918; Ash's, 1918, pp. 190-197.

23. Jordan, H. E.: The Comparative Histology of the Enamel Organ of the Mammalian Tooth, with Special Reference to Its Blood Supply, Am. J. Anat., 29: 379 (Sept.) 1921.

24. Addison, W. H. F., and Appleton, J. L., Jr.: Vascularity of the Enamel Organ in the Developing Molar of the White Rat, Am. J. Anat., 31: 161 (Nov.) 1922.

25. Kingery, H. M.: Vascularity of the Enamel Organ in Mammals; a Comparative Study, Proc. Am. Assoc. Anat., 1923.

vessels do not occur within the enamel organ of mammals," Addison and Appleton advise that observations on the vascularity of the enamel organ have generally been incidental to some other main problem. Also, they state wisely that "the possibility that an enamel organ may be nonvascular at one stage of its development and vascular at another stage is ignored." Kingery's description of the vascularity of molars applies, with no difference worthy of note, to incisors. He would have the relation of the surface of the enamel organ and the layer of developing enamel explain the absence of vessels in the reticulum of incisors, saying that "a sufficient supply of amelogenetic materials can be taken from the vessels at the external surface of the enamel organ." The evidence is that, whatever the continuity of the blood supply throughout the history of the enamel organ, a blood supply is found in the anterior as well as in the posterior teeth, and that the correlation between it and the larger enamel surface of molars is a faulty hypothesis. Doubtless, research would show that the whole dentition has a similar history in close detail.

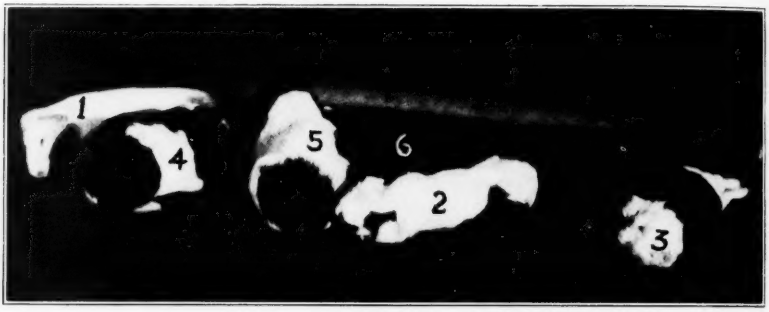
NEUTRALIZATION OF BACTERIAL TOXIN*

By THOMAS B. HARTZELL, M.D., D.M.D., F.A.C.D., and W. P. LARSON
Minneapolis, Minnesota

TWO demonstrations were made showing the power of pure castor-oil soap to neutralize bacterial toxins. One in the research section, Wednesday afternoon, November 12, and the other in the clinical section, Thursday afternoon, November 13. The lethal dose of tetanus poison for a 300-gram pig having been previously determined, the dose was then multiplied by 100, and on the morning of November 11, six guinea-pigs received 100 lethal doses of tetanus toxin, the injection being made under the skin of the hind leg of each animal. Three of the pigs injected that morning received in addition to the tetanus toxin, and mixed with it, 0.5 cm. of 1 per cent pure castor-oil soap. These six pigs then were shown on Wednesday afternoon. The three that were unprotected by the addition of soap solution died early in the morning, Wednesday. The three pigs that had received the soap solution in addition to the dose of tetanus toxin seemed quite normal and well. Since, because of the heat and the rapid decomposition of the dead animals, it became necessary to prepare two additional pigs to exhibit in the clinical section on the Thursday following, two additional pigs were given each 100 lethal doses of tetanus toxin, Wednesday afternoon. These pigs also died about 8 o'clock in the morning of the next day, Thursday; while the pigs used in the demonstration of Wednesday seemed to be in good condition and were used during the afternoon of Thursday in the clinical section, together with the two dead pigs that were injected on Wednesday evening. The pigs receiving the tetanus toxin and soap solution

*Presented as a clinic before the American Dental Association, Dallas, Texas, Nov. 10-14, 1924.

were apparently in about as good condition at the close of the second day as they were before injection. In order to produce the picture used to illustrate this clinic, we have repeated the experiment on the additional pigs shown in the picture, at our Minnesota laboratory. The protected pigs received their poisonous dose November 20, more than a week ago, and are in normal condition, as shown in the photograph. Castor-oil soap was first made by us for the reduction of the surface tension of fluids in culture mediums. A description of its method of use and refinement may be found in the *Journal of Infectious Diseases*.[1] Its value as a neutralizer of bacterial ferments and poison was a subsequent observation, and is here shown for the purpose of encouraging its use, particularly in the mouth, where the neutralization of bacterial poison is desirable in order to protect the mucous membrane and teeth from attack by bacteria. We have examined all the commercial soaps, including those in all the tooth paste now on the market, and have found that none possess the power to detoxify bacterial poisons. Owing to its dialytic quality, castor-oil soap has the power to penetrate fatty coats of bacteria. It makes an ideal wet dressing for wounds, and is useful for cleansing tooth surfaces, for spraying throats, antrums, etc., and for the tenting of sockets in extracted teeth.



Pigs 1, 2 and 3 died promptly. Pigs 4, 5 and 6 are living, Dec. 31, 1924, after more than six weeks, and are healthy.

1. Larson, W. P.; Cantwell, W. E., and Hartzell, T. B.: Influence of Surface Tension of Culture Medium on Growth of Bacteria, J. Infec. Dis., 25: 41 (July) 1919.

HEALTH AND EDUCATION

By WILLIS A. SUTTON,* Atlanta, Georgia

(Read before the American Dental Association, Dallas, Texas, November 10-14, 1924)

IT IS a great pleasure and at the same time a great responsibility, and one that I undertake with fear and trembling, to speak to a crowd of dentists about something that I don't know anything about. I know a great deal about the effects and the results, but I know very little about the process.

I want to say a few things to you tonight because I feel the obligation of this thing and feel it tremendously. I don't believe that half of us as dentists realize in our profession what Dr. Hollister has told us tonight. I hope I won't step on anybody's toes as far as ethics are concerned. I got in a terrible row over at Birmingham because I wasn't understood; but I do believe that if a profession implies anything in the world it implies a responsibility, and I think we ought to realize that dentistry is a profession, not an occupation, not a trade, not a means particularly of making a living, while it indirectly does that, but a responsibility that is on you to keep the mouths of America clean, and you can't do that by simply putting up on the outside of your door a sign that you are a dentist; you can't do that by treating the people that come inside of that door. You must have a responsibility to the people on the outside, and frankly I say to you as a teacher that, unless you have that responsibility, you will make a very poor dentist, and unless you feel it and carry it out, the health of your people and of your community is not going to be benefited largely by your presence in it, whatever else of good you may or may not do.

This is my theory (I may be wrong): if there is any ignorance in Atlanta I am responsible for it and my predecessors are responsible for it and the teachers of Atlanta and the college men and the college women and the private schools and the private school women are responsible for it.

If there is bad health, if there is yellow fever, smallpox or epidemics, whatever they may be, I think the doctors of Atlanta are responsible for it.

If there is injustice and lack of carrying out the law, the lawyers of that city are responsible for it.

And if there are any sinners there, the preachers are responsible for it.

I say to you, if there are any bad teeth there the dentists are responsible for them. That is a thing that I believe with all my heart. I didn't get that just today but by persistent and careful study, and I believe that you owe a responsibility to the community in which you live to see that the school board, to see that the school superintendents, to see that the parent-teacher associations, to see that the mothers' councils, that the women's clubs and that the other organizations that stand for the welfare of children in that community are looked after.

I will go a step further. I doubt whether any single individual child in America ought ever to be given corporal punishment without an examination of

*Superintendent of Public Schools, Atlanta, Ga.

his teeth. I don't much believe in corporal punishment anyhow, but I have my doubts about that, and I say it with some little basis for it.

About ten years ago, there was sent to me a sort of round robin signed by seven teachers, about a certain boy in the school of which I was then principal, in a rather respectful way and yet I caught it very clearly, that I could expel such-and-such a boy from the school (his name was Woodruff; I don't think he would mind my calling his name) or I could accept their resignations. I had had a great deal of trouble with the boy. He had been sent to the office time and time again. The boy had never displayed any considerable interest in anything that I had said to him.

I sent for him. He came into my office and I said, "Here, Woodruff, you read this." He read it. I said, "You know I can't get rid of seven good teachers, and, son, you'll have to go home. That is the ultimatum and you have decided the question yourself." To my utter astonishment that 17 or 18 year old boy began crying.

He said, "Professor, if you turn your back on me, I haven't got a friend in the world."

I said, "You know that's not so. You've got a mother and father." I noticed when he was crying that his teeth were bad. I said, "Come in here." I took him in to the light and opened his mouth. It was the foulest mouth, I think, that I have ever seen in all my life. There came a flash into my mind of another way I might save that boy, because that was my whole idea. I said, "I'll tell you what I am going to do. I am going to write these men a note. I am going to say that I think your teeth are responsible for your bad conduct and that I will not expel you from the school until you have your teeth fixed, and I will do that only on a promise from your father and from you that you go this afternoon and start to have those teeth put in good condition."

I called the father over the telephone, and the father and the boy promised. I sent the note to the teachers. That boy stayed with us for two and a half years, graduated with distinction, went to Georgia Tech, and graduated from Georgia Tech, and he is in the state highway department of Georgia today. He is making a fine salary.

From that day to this, I never have had one single word as to his misconduct. The whole trouble with that boy was that every front tooth and maybe some of the back ones in his head were practically rotten, and there was a nervous and a diseased condition as a result that made it impossible for him to do the work that he ought to do, made it impossible for him to sit still, made it impossible for him to be obedient; and he was about to be expelled from school.

My experience with that boy led me to a study of this subject. When I came to be superintendent of schools, I found a good friend in Mr. Cather Woolford of our city. I said, "I am satisfied that much of what is going on in Atlanta in the way of failure among our boys and girls is due to bad teeth. I wish I could make a demonstration. I have appealed to the school board, but they can't understand it. If I could show the results, maybe they would listen." He gave me a dentist and a hygienist. But we didn't stop with that. I said, "I want a playground director and I want a nurse for that school and I want a thorough physical examination, and we want to follow out all these things in that one school of 987 pupils," which we were going to use for the demonstration.

He gave me those things. He gave me about $15,000 that year as an experiment. I set to work. We put the dentist in the school and put in a clinic. We examined and cleaned every child's teeth. We tried as rapidly as we could to put every child's teeth in A1 condi-

tion as nearly as we could. At the same time we went at these other things like nutrition and home affairs and baths and so forth. We put in shower baths in that school and gave these children shower baths at least once a week. We went into those things in full detail.

Before that year, we had had 32 per cent of the children in that school fail. Before that year, we had had over 3,800 absentees from those 900 and more students. I got the complete record, and after their teeth were put in good condition, I kept the record for nine months. By that experiment, we saved 1,200 school days. Every school day is worth, according to the United States Government, depending on the grade, from about $10 up to $40 a day, but putting it down at $10 a day and seeing 1,200 school days lost, you begin to realize what we saved in money.

Then we commenced to go into the other phase of the subject. Where we had had more than 30 per cent of the children in that school failing, we dropped in one year to 8 per cent, and where we had had children who looked pale and anemic, they grew in health. We kept a record of every child's weight and height as the months went along during that year; and, as a result of that, I was thoroughly satisfied that we had found at least one thing that would obviate much of the expenditure that we had in teaching over and over and over the children of the country.

I want to tell you another thing. I listened very closely to Dr. Hollister's paper. We have the trouble he spoke of in Atlanta. A great many dentists don't want to bother with children's teeth. In many respects, it is the most important work, in my opinion, that you do.

In the State of Georgia, we have 258,000 children in the first grade; in the second grade, we drop to about 128,000; in the third grade, we drop to about 80,000. In other words, in the first grade, we have more than twice as many children as we have in the second grade, and in the first grade, we have about three times the number of children that we have in the third grade. In other words, it is taking the average child in Atlanta two years to finish the first grade.

If you inquire as to when those children's teeth are dropping out and when they are having trouble getting their teeth back, you will find it is right there in the first grade. Of course, other things like measles and such things are to be taken into account too; but it is one of the most important periods in the child's life as far as his teeth are concerned. Georgia today is paying for the teaching of at least 100,000 children in the first grade two years, where we ought to teach them just one.

These things should be considered before children go to school; they ought to be considered in the pre-school age circle. All children ought to be prepared physically to go to school. One of the saddest things in the world is the fact that our people don't realize that the child is not prepared to go to school just because he has on a clean waist and a clean pair of breeches and new shoes, and has some new books under his arm. He hasn't been prepared in the way of eye and ear tests, and immunized against colds and children's diseases.

I often say, in discussing the value of the kindergarten, that leaving out the educational value it is worth all the money we put in it just to have all the children have the measles, whooping cough, chickenpox, and so forth, and get through with them. I don't mean to say that any child ought to have those diseases. I think the doctors ought to see that they don't have them, but at the same time it does get them ready.

This is about what happens to the average first grade child: He goes to school, and the doctor comes to examine him. He finds he has bad tonsils or

adenoids, and, first, he finds that he has not been vaccinated. The doctor vaccinates the child and he is sick two weeks from that and he loses that time. He has to have his adenoids removed, and six more weeks are gone. About that time, the dentists examine him, and there is something the matter with his teeth and three or four weeks more are gone. Then half the year is gone. The little fellow doesn't know anything; he couldn't learn anything; he fails in the first grade, and starts out life with the consciousness that he is a failure and can't make the progress that he ought to make.

I don't know whether we are going to get at that condition or not, but I believe that in three years' time we will say to every child, as we say now, "You can't enter this school unless you have your vaccination certificate" that he must have pinned to that certificate another from the dentist stating that his teeth are in A1 condition.

We went into two kindergartens this year during the summer time. We sent our visiting teachers and nurses to every child. Every time a mother came up and registered a child to start in the kindergarten in September or sent a ticket, we took the name and address and sent the nurse there to look after all these things before the child started. The child had a doctor's certificate that he was in as nearly perfect health as possible and a dentist's certificate that his teeth were all right. We had about 150 children in these two kindergartens that we are going to follow through life. We have organized the mothers of these 150 children in the two kindergartens into a circle. They meet once a month. The dentist goes out there and meets with them, the nurse and the doctor go out and meet with them, and they report individually on every child in that meeting and let the doctor, the dentist and the nurse look at the children. We are going to follow them right through.

I want to tell you what has already happened in those kindergartens, and this is only November. We have two groups of children of about seventy-five each, and of the 150 children, we have had only two absentees from September 4 to date. It shows what the care and preparation of those children will do in their school attendance.

We have gone a step farther. I say, "That is all right, but I want to find out whether this trouble can be cleared up and whether we can remedy even very bad conditions."

I went into another school and took eighteen children. We had eighteen grades and teachers in that school. I said to each teacher, "Give me the worst pupil in that class, the child whose morals and lessons and home conditions are worst." I sent each one to a dentist in our city and asked those dentists if they would not take two of these children. I said to the visiting teacher, "On every Tuesday afternoon, I want these eighteen children taken to these dentists, and I want them to continue these visits until their teeth are put in A1 condition." I said to the teacher, "Keep a record of the weight and height and growth and physical development of these children. We took their pictures at the beginning and at the end of the term. When he had finished the experiment, eighteen children who the previous year had not passed in a single subject, who were repeating the whole grade, had but one subject failure in the whole group, one subject in which one child failed, and the rest of them passed in everything.

The doctor said he did not consider correction of mouth conditions a panacea for all ills, but I am here to tell you that it is almost a panacea for anything. Almost any unhealthy condition can be remedied if you get the child's mouth in A1 condition. I am thoroughly convinced that is the truth. My question is: How can we get that program over to the parents and school boards and

state boards of education so that they will take it up? There is but one group of people in the world they will believe, and I don't know whether they will believe you or not, but they will believe what you have to say about it because they believe you know something about it. They think I am trying to get another frill put in the public schools. If the dentists will get back of this proposition and say one by one to these members of the school boards and some of the school superintendents, because they are as hard-headed as the members of the school board, "Here, I want to talk to you about this situation and show you what I think could be done," they may take some interest. The more prominent and the better established a dentist is in his profession, the more effect he will have, because the school board will understand that he has plenty to do; that he is not trying to feather his own nest, but that he is trying to work out a problem in his community.

We went into several other schools and made tests. As a result, I succeeded in getting the fifth district dental association (that is our little congressional district in Atlanta, and there are about 160 dentists in the district dental association) to endorse this matter and go before the finance committee and get an appropriation. We put a dentist and two hygienists in the field among the white children and a dentist and hygienist among the negro children. With 50,000 children in the schools, we couldn't do all the dental work, but we could make the examination, and we did make them and marked the teeth, and were careful in putting on the slip, "There seems to be something wrong with the child's teeth. A dental examination is necessary. We recommend that you carry this to the dentist." We gave the child that card, had the dentist sign it, and then had the child bring it back.

In two weeks, if he had not brought the card back or had not reported that the work was done, we sent the nurse to the child's home to talk to the mother and father. Then, in case they did not have it done through that dentist, we sent another card saying that such-and-such work had been reported as not being done and that if for any reason they could not have it done with the family dentist, would they please sign the certificate, stating that they were willing to have it done by the school dentist or some other person we might have assigned to the case. We had other dentists in various clinics to do the work for us when we could not get the family dentist to do it. As a result, about 15,000 children have gone to the dentist and brought the certificates back properly signed. That was last year.

We found out that we had to do something else, that as much as we thought the examination was all right and as much as we thought the information to the parent was all right, it did not end our duty. Our duty ended only when we had exhausted every means possible to get that work done, and the one means to get it done was the child, and we had not worked on the child as we should. We went out into the schools. I left everything and did it myself. I did not give anybody else direction to do it.

We said, "We want the children in this school to stand 100 per cent in their teeth conditions. The only way we can get it done is to get the children to cooperate with us." A bright idea, at least it has proved a very happy one, came into my mind. I said, "Whenever we get a room that has 100 per cent teeth, we are going to do something for you. How would you like a holiday?" You should have heard the handclaps and have seen the faces shine. I said, "We are all losing on the average of about four days a year on account of teeth anyhow. We might as well lose one on account of having good teeth. Every single grade in this school or any other school that will get me a dentist's certificate (they may not be all right but I will have to depend

on the dentist) that all has been done that could reasonably be expected to be done and that your mouth is in good condition, can make the chart, and we will put your names on this side as a class roll and we will put 100 per cent on this side, and whenever the teacher files that certificate and has all those certificates filed and all the names on the other side of that card, including her own (no teacher can give her children a holiday if she has bad teeth), you can have a holiday." You never saw a thing work with such magic in your life. Our dentists were flooded with work. Some of our dentists that hadn't had much to do were getting busy.

I made that announcement on Tuesday morning. I had to give my first holiday on Friday of that same week. One mother called me up Wednesday afternoon about five o'clock and said, "Do my children have to have their teeth fixed today?"

I said, "I guess not. What are you talking about?"

"My little boy said if he didn't have his certificate back tomorrow he and all the school would miss a holiday. He has been in the dentist's chair for two hours and he has one more tooth to fix and one that needs pulling and I don't think he ought to stay here any longer." It shows you what we got in results. The children got busy. We pitted one school against another. Last year, we took the fifth district dental association to the school where we first tried it. You don't know what a difficult job it is even to get people to consent to have their teeth fixed, much less pay for it; but we finally got them to consent to it. At last, in one school with more than 600 children, every child had a certificate. Then, I said that when all the schools had attained 100 per cent, we would have another holiday. I am glad to say we have had two of those so far.

There came another thing. We had a little health book in which each child marked every morning whether he had brushed his teeth. We couldn't depend on that. Children who said they had brushed their teeth every morning had foul mouths. We gave the hygienist instructions to give the drills in every school. That was not enough; the drills didn't do it, the motion didn't do it; so we took five minutes of the physical education period every day and said, "You get two toothbrushes, and if you can't buy two, we will buy them for you." A man gave me $500 to buy toothbrushes. Then I said, "You bring a glass, and we will put your name on it." Then I got in a row. The physical director said, "Why, Mr. Sutton, that is not sanitary.

I said, "Which is less sanitary, to have all of the germs in the mouth and swallow them or just get a few because the toothbrush is put down in the water? It may not be most sanitary, but it is more sanitary than swallowing them all, so we are going to have a glass and a toothbrush." During the first five minutes of the physical education period, everybody goes to the hydrant and fills his glass of water, and everybody gets out his toothbrush and some tooth paste and not only goes through the motion but actually brushes his teeth for five minutes. I wish I could show you a school where that has been consistently carried out for a year. I have never seen such marvelous results in my life. We call that little school "Goldsmith's school." They have what they call the "Goldsmith smile." That condition prevails all over Atlanta now because they are not afraid to show their teeth.

Then I found out that you couldn't even depend on that, that you have to have something back of that. You can't take muscle and succeed; you have to get spirit and heart in it. The minute school was out, I found that our drill and our compulsion and our force all fell down. I said, "We are not going to stop with the parent or the teacher or the dentist or even with the interest of

the child for the physical education period. We are going to sing that thing into the heart of every school child in Atlanta." So we offered prizes for the best songs about brushing your teeth and keeping the bugs out and keeping the teeth clean, and every school got up a great array of songs and everybody is singing about keeping the teeth clean.

The effect of it has been magical. I am not giving you an ideal or a dream. It is a positive fact. I have never seen anything in all my life have such effect. As I go into the schoolrooms in Atlanta, the first thing that I see as I go in is some child getting his handkerchief out and he commences to brush his teeth off with it because he knows I am going to push somebody's head back and look in his mouth, and he is afraid it might be his and his teeth might not be clean.

We had 83 per cent attendance in our school system when we started that. We have risen to 96.7 per cent average for the entire school year. That means there are only about three children absent out of every hundred children in a day, and we have raised the standard of our schools in promotions from 28 per cent failures to less than 8 per cent failures. We have brought a happiness into the thoughts and minds of the children that is marvelous to see, and just makes your heart glad.

Then we have done something else. We have increased the morality of our boys and girls as well as the health of their teeth. I don't believe in cussing, but I believe it would be much harder for a boy to use vulgar words with a clean mouth than with a foul mouth. I believe it would be much easier to speak the truth and to be honest and square when you are not literally eating filth and poisoning the system.

I believe it would be very much easier to make a great, good character with a clean mouth than it would with a foul mouth under any conditions that you may put around a boy or girl.

We have tried our best to impress on those boys and girls the fact that if you eat with foul teeth you are eating corruption. We had some teachers who went just a little bit too far, and in order to get their children to keep their teeth clean so that they might get a better record, they got up a concoction of turpentine and soap and some other things, and if a child didn't brush his teeth at home they made him brush them with something that hurt. We had a little discord with some parents, and I don't blame them, but we got that all ironed out. In a great movement like that, you are bound to get some things that possibly you don't want, but you attain great results.

The thought that comes to me is this: In the great problem of education, what is the most important after all? I am going to answer that the most important thing in education after all is to make a race, is to make health, is to have strength, is to have strong bodies that will be able to beget strong children and to make a race out yonder somewhere.

We had an idea that school was for Latin and Greek and French and Spanish and algebra and geometry and a great many other things, some of which are good and some of which are no account. I say that as a school man, too. I guess I will be "pitched out" for saying it, but the idea of going all through this world and cramming, especially into some girls' heads, thousands and thousands of equations that will never be worth straw to them, and they don't know how to make a biscuit or to clean their teeth!

I don't want education to be purely utilitarian; I don't want it to be on the dollar basis; but I do want it to be enough utilitarian and enough on the dollar basis that the race won't run down and that we will have something to live on and make a country prosperous.

We have taken this whole thing backward. We ought to have started there. Here in the year 1924, there are still

school boards and publics and dentists and doctors who have to be pounded into adopting and carrying forward a health program in education. The World War showed us that about 28 per cent of our boys were not fit to go to war because they were defectives. The World War revealed to us that, as a race, we were going down when it came to our physical stamina, and we had to reject great numbers of boys and say they could not go into the siege.

What good will it do if we go to the point where we learn all the theory of education but haven't a race? As I have said to my boys time and time again, "The most important thing I am trying to teach you first is to be a clean man and a good father. If I can teach those two things, I will have done you more good than I will have done by teaching you all the Latin and all the Greek in all the world."

Two hundred or five hundred years from now, we can learn some Latin if we get in good shape or we can learn some Greek or we can learn a lot of these other things; but 500 years from now there won't be anybody to learn anything unless we take care of the health of our people.

A further fundamental thing in education is to get at this thing that makes stamina and backbone and that builds up and carries forward. I doubt whether any of us realize what a great transition is coming about in America. We are in the midst of it. We don't realize how we are changing from a rural people with all the things that made for health in rural life, with all the turnip greens and pot liquor and cornbread and buttermilk and all the coarse-grained wheat and all the coarse-grained bread that went into making teeth and making bone. We come into a city and miss the outdoor life and miss the civilization, I call it, that was back there. We miss all those things, and turn into an urban people with all this fine ground flour and all these things that we eat. We don't know how to cook the vegetables that make food value for our bones and our teeth, and we have changed completely the life of our people. We have got to adapt ourselves to it and we have got to take care of it. The day has passed when those things out yonder would compensate for the lack of care of the teeth or the lack of nutrition or of health.

Another thing, the nervous and the physical changes that have been wrought on our people are marvelous. Have you realized that our children are growing up faster than they ever have in the history of the world? That is not just a fancy because you and I are older. The 12 or 13 year old girl today is thinking about the dance and the party and the thing that the 23 year old girl thought of less than twenty-five years ago. She has advanced right up to this point. The boy is the same way.

That has occurred because, in this great excitement of life in cities, we have been thrown into the current of nervous experience and into the current of life that has a marvelous effect on our glandular development and throws the secretions of our glands into the system long before they are accustomed to being thrown in other days, and it has brought about a development that is entirely different. We have to do something to counteract it and something to save our race.

Take just the elemental emotions that come out of our inventions; take the phonograph, the telephone, the automobile, the flying machine and all these inventions that have come about; every one of them has stimulated the nervous system, which in turn has reacted on the physical man and tended to make him mature long, long before he ought to be mature. We have to bring back some kind of current into that life that will counteract that.

What are we going to do about it? We are going to teach those things that are right; we are going to teach the

right kind of health education; we are going to put that child unconsciously on his guard and give him the right things that will keep him a boy, and will keep the girl a girl at 12 and 14 years of age, rather than make them old men and women, worn out at 18 and 20.

I lived in Alabama the first nine years after I graduated from college, and taught there, and there was in that state a great man, who had some beautiful children, among them a daughter. He came to be chairman of the Federal Reserve Board of America. This beautiful daughter then got into the midst of society and life in Washington, and she went into all those things that girls at 18 and 20 had been accustomed to, when she was 14 or 15. She had literally drunk the dregs of life and all of its pleasures by the time she was 18 or 19 years of age. She had matured, she had no teaching and training to meet that crisis, and especially to take care of her health, and she went into her room at Boston, Mass., at about the age of 19 and drank poison and killed herself.

That is not just one case. I went into a schoolroom the other day and was talking about this question of health. I said to the children, "I reckon none of you want to die." One fellow stood up and said, "Yes, sir, I want to die." I thought he was joking, but I found he was in dead earnest.

I took that boy off and talked to him for an hour. He had seen and gone through an experience in which, at the age of 16, everything in the world had gone by. He said he didn't see another thing to live for.

We laugh at that. It is one of the most tragic things in the history of this country. The fundamental thing in education is that we are going to start (we ought to have started way back with the grandparents) the day that a child is born and that child ought never to be out from under a doctor's care. From the time that his teeth come through, maybe he ought never to be out from under a dentist's care.

Dr. Hollister spoke about getting ourselves out of a job. You will never do that. Just as long as there are people, there is going to be a need for dentists.

I sat down patiently and calculated that, with the number of dentists in America, if every cavity in America was fixed, it would take the present generation of dentists about 116 years working eight hours a day to do it. You needn't think about getting out of a job.

I want to say to you that our problem in education must be got before the people, and you as dentists ought to go back and at least take your share of it, and point it out to the men and women on the school boards and directing your children and your school affairs, and say, "Here is our problem, and we want to see it carried out." When you have done it, you will have made a real contribution to the life of the community and the life of the people.

In our town we have Dr. J. G. Williams, who has been appointed by the fifth district dental association to sponsor this work. He is not getting any of the patients as a result of it or very few of them, but he is giving about half of his time to the work. He goes with me to a classroom and he talks to the boys and girls. I don't know much about the theory of it, but I try to get up the "arousement" and back up what he says, and see if we can't get it across in the classroom.

I am satisfied that, in every school we visited last Monday morning (about forty-seven), the results have been that, out of every class of thirty-five or forty children, there have been at least ten children who have applied to make an engagement to see the dentist during the coming week.

I want to give you this as a closing remark. We are adding not only to the efficiency of the race out yonder and to the efficiency of the race now, but we are

adding to the actual living life, to the years of the race.

I am very much of the opinion that if we take a boy or a girl in the first grade and take care of the teeth until he or she is 18 years of age, and instil the habit of taking care of the teeth and looking after them periodically, taking the whole country over and taking those boys and girls into account and instilling into them the habit, we will add to the life of every one of those who get that habit five years of time. Five years of effective living is worth saving, and five years of time added to all this host of boys and girls that are represented by the American Dental Association all over America would mean in the aggregate more time than there has been since the creation of Adam down to the present day. It means more of life and more of abundant living.

It is a great challenge; it is a mighty responsibility; it belongs to you, and don't you go out of here tonight and say, "We just simply had a fellow who tried to preach at us," but you go out of here with this idea, "Back in my district I am going to consult the board of education, I am going to consult the superintendent of schools, I am going to do my level best to see that the children of my community and the community in which I live have some of the effects of that which my money and other people's money has put into my hands and put into my head and into my skill."

If you belong to a local dental organization, even if there are not more than four or five dentists in your community, you have a great responsibility; and if there is just one there, you have a greater responsibility. But let us take those four or five or eight or ten or fourteen or one hundred and fifty and say, "This is our job. We are not going beyond dental ethics, but we are going to see that we serve this community;" and when you have done that, you may rest and say you have performed the duty that you took on yourselves when you took the oath that you would practice your profession in an ethical way and that you would serve humanity with it.

Service, service! There may not be all the money coming out of it that there ought to be, and that I hope there will be, but there will come a consciousness of duty done. There is no man in this house nor anywhere in Dallas tonight that made a struggle to come to see you or to be with you more than I did. I do want you to realize that I did not come here to make a speech. All the speaking I do to entertain folks I did before I was ten years old. All the speaking I have tried to do from that time on has been a consciousness in me that I have got something that ought to be said, that must be said, that it is a duty to say.

The thing I want to get on your hearts and consciences is this: Do you realize that there is something you ought to say, that must be said in your community, and that must be done? Do you realize that you are the man given the privilege of coming to this great organization and coming to this great profession and belonging to this great company of men and women that make up this profession, that you are the man and you are the woman who is called? Are you ready to answer "Here am I. Send me"?

HOW TO OBTAIN BETTER HEALTH SERVICE FOR THE PATIENT THROUGH CLOSER COOPERATION BETWEEN DENTIST AND PHYSICIAN

By THEODORE L. SQUIER, B.S., M.D., Battle Creek, Michigan

(Read at a joint meeting of dentists and physicians from the third, fourth, fifth and sixth districts of the Michigan State Dental Society, Battle Creek, Michigan, December 8-9, 1924)

BOTH the medical and the dental profession have th same ultimate goal—the conservation of the patient's health. Indeed, from the earliest time down to about the eighteenth century, dentistry developed as a part of general medicine. Even Hippocrates mentioned that abscess of the ear and necrosis of the jaw might result from diseased teeth. Over a century ago, Benjamin Rush reported the cure of a case of rheumatism following the extraction of a diseased tooth, and he expressed at that time the opinion that diseased teeth were, "often unsuspected causes of general and especially of nervous diseases, and . . . that all success in the treatment of chronic diseases would be very much promoted by direct inquiries into the state of the teeth in sick people and by advising their extraction in every case in which they were decayed." Of course, with modern methods of dentistry, this advice of Dr. Rush is no longer applicable in its entirety. However, too often physicians nowadays give their patients' mouths but scant attention. Indeed, the separation of dentistry from medicine has unfortunately had several detrimental results. The dentist is prone to consider the patient from the standpoint of the teeth alone, disregarding the general pathology. As a result of this failure to inquire into the general health, the dental treatment in a given case may be definitely harmful to the patient, or at least may be ill-advised.

It is one of the objects of this paper to urge the dentist to take the general health of the patient into consideration in determining the character of work to be done. Also, it is desired to urge the physician to consider the teeth with more care. To accomplish either aim there must be closer cooperation between the dentist and the physician.

It is not my purpose to name or discuss the multitude of diseases that are caused primarily by diseased teeth. That has already been discussed and accepted by all.

Miller,[1] in 1891, wrote:

> The custom of many physicians to disregard dental diseases altogether as a factor in pathology is as unjust to their patients, as it is discreditable to their profession, and no physician can afford to be without a thorough knowledge of the pathological processes occurring in the human mouth and their relation to the general disease.

Fortunately, within the last few years, physicians have scrutinized the teeth rather carefully in diseases, such as rheumatism, in which focal infection has been emphasized, but inspection of the teeth has not been always made a routine part of the examination of every

1. Miller, W. D.: The Human Mouth as a Focus of Infection, Dental Cosmos, 33: 689, 1891.

patient. The presence of crowns, bridges and pivot teeth should be noted by the physician at the time of examination, and infection suspected until proved absent. If anything in the general examination leads to the suspicion of focal infection, a careful dental examination is indicated; and the patient should be referred to his dentist. It is to be remembered that, after all, the physician has the final responsibility for the patient's health, and consequently he should demand and get the proper cooperation from the dentist. Too often the possibility of a dental pathologic condition is overlooked by the doctor because he finds the teeth clean and well cared for, with no gross abnormalities present. It must be continually borne in mind that serious dental infection has definitely increased since the development of mechanical dentistry and consequent sealing in of infection, and that the mouth apparently well cared for is by no means necessarily free from serious dental infection. The roentgen ray is too valuable an aid to be neglected whenever there is suspicion of disease, but it must never be forgotten by either physician or dentist that a roentgen ray shows only the result of infection. A tooth may be seriously diseased and still present roentgenographically no visible evidence of trouble. Consequently, the opinion of the roentgenologist, the physician and the dentist should all be considered in arriving at the final opinion.

Occasionally, there is a physician who advises wholesale extraction of teeth on general principles. He apparently fails to realize that his opinion may not be the best in this highly specialized field. Such a situation is rather difficult to handle gracefully, but if, in the opinion of the dentist, such extractions are unwise, he certainly should not hesitate to discuss the matter with the patient's physician. If the physician has the patient's interest at heart, he will either convince the dentist that extraction is necessary, or he will retract the advice he has presumptuously given. If he has no good ground for his recommendation and still insists it be done against the dentist's advice, extraction should, of course, be refused. Dr. J. M. Anders has rightly spoken a warning to the medical profession as to the unfavorable reaction almost certain to follow reckless and ill-considered sacrifice of teeth.

Proper cooperation on the physician's part lies, then, in being constantly alert to the possibilities of dental infection as an important factor in the patient's general health. He should realize that he is not trained nor is he expected to give final advice about the teeth until he has had a consultation with a conscientious dentist. The physician, remembering his responsibility to the patient, should be sure that the dental opinion is a careful, honest one. I say honest advisedly, because it is not an unnatural reaction of the part of the dentist who has just recently completed rather expensive dental work to be reluctant to condemn it, as sometimes is necessary, and advise extraction. It is most unfortunate that the public at large has developed the idea that one can have a dentist look over the teeth and express an opinion free of charge. That sort of opinion is almost worthless to the physician, and to the patient it is even dangerous. The physician wants to know whether all teeth are vital; what teeth, if any, are diseased; whether any teeth should be unqualifiedly condemned, and whether some teeth are possible harbors of infection but cannot be condemned positively.

Such an examination, as a rule, requires the use of the roentgen ray and is of such nature that the patient expects to pay for it, and will do so gladly; for he realizes that he is getting the sort of information that is worth while. It would appear that not all of the dental profession realize just what is wanted by the physician in such referred cases. It

is certainly true that, not infrequently, after a patient has been sent to his dentist, the physician is informed, generally by the patient, that the teeth have been looked at and are all right; when, in spite of the fact that some teeth are crowned, dead or extensively filled and badly discolored, no roentgenogram has been taken, no test for vitality made and apparently little thought given the possibility of concealed infection. Remembering again that it is squarely on the physician that final responsibility for the general health of the patient rests, the doctor has little choice, under the circumstances, but to ask for reexamination by a dentist whom he knows will give him the kind of opinion he requires. Again, the situation is a delicate one. The first dentist is liable to be aggrieved at the physician, feeling that there is unwarranted interference. Even though further investigation fails to uncover any pathologic condition, the physician is absolutely justified in his attitude.

It seems almost unnecessary to emphasize that the physician has not been fair to his patient unless he urges dental treatment whenever he finds a grossly unhygienic mouth, regardless of any bearing it may have on the patient's immediate condition. However, it is certainly true that there are many patients suffering from far advanced pyorrhea who have been seen repeatedly by their family physician and yet have never once been urged to consult their dentist for treatment. Hartzell[2] has pointed out that if each of the thirty-two alveoli and thirty interdental spaces were affected with pyorrhea to a depth of one-fourth inch, this involvement would be equivalent to an ulcerating surface of 7½ square inches. Certainly, if such ulceration occurred anywhere else on the body surface, treatment would be urged, and if the doctor has his patient's interest at heart he will certainly insist on dental treatment. More important still is the advice of a dentist if the mouth is filled with crowns, bridges, etc.

Thus far, we have been largely concerned with the relation of the physician to dental diseases.

In a similar manner, the dentist must recognize a certain responsibility for the general health of his patient. Often, he will see something that leads him to suspect a general or local disease demanding medical care. Under such circumstances, he should urge his patient to consult his physician. If, on examination of the teeth, badly swollen and apparently diseased tonsils are seen, it would not be amiss to ask a few general questions as to the frequency of tonsillitis and quinsy, and to suggest that it might be advisable to have the opinion of a throat specialist. Certainly if leukoplakia or mucous patches are seen in the mouth, the dentist's own protection demands that the patient be referred to his physician to determine the cause. The extreme pallor of the mucous membrane of anemia, the fruity acetone breath of the diabetic, the dyspnea of the asthmatic or cardiac patient, the unequal, irregular pupils of the syphilitic, the edematous lids of the nephritic, the simple enlargement of the thyroid gland or the bulging eyes and extreme nervousness of the patient with exophthalmic goiter are a few of the signs of general disease that the dentist can note at a glance. It is not for him to make diagnosis, but if he has his patient's welfare at heart, he will inquire whether the patient is under a physician's care. If he is not it is certainly in order to suggest a medical examination.

Viewing the dental profession from the standpoint of an outsider, it seems to be free from the multitude of quacks that infest the medical profession. Of course, there are unethical advertising dentists, but, after all, in order to prac-

2. Hartzell, T. A.: The Responsibility of the Dentist and Physician as Regards to Mouth Infections, etc., J.A.M.A., 61: 1270, 1913.

tice dentistry one must be at least licensed in that profession. This is by no means true of the medical field, which is flooded with faith healers of various kinds and descriptions, chiropractors and whatnot. I will venture that there is not a dentist here who has not cared for the teeth of patients suffering with more or less serious ailments who are followers of some one of the irregular cults. You can do a great deal toward helping such patients to realize that they need different medical advice. It must be done tactfully, of course, but frequently it can be done as certainly as the doctor can direct his patient from the "Painless McArthurs" of dentistry, to a reputable, honest man. If we both have better health service for the patient at heart, as certainly is the case, then I am sure your profession will help keep its patients out of the hands of medical charlatans. It would be possible to talk at length about this phase of cooperation, but I am sure all of you realize its importance.

When extensive conservative dentistry is to be attempted, the dentist who is wise first assures himself of the patient's general health. Work that would stand for years in the mouth of a normal individual may have to be removed in a few months when some systemic disease is present. I have in mind a very recent incident illustrating this point. A young man had some extensive crowns and bridgework made in Chicago, and three months later he was examined and found to have far advanced tuberculosis. The nonvital crowned and bridged teeth were found abscessed, on roentgen-ray examination, and work that he had paid $175 for three months previously had to come out, much to his chagrin. It would seem that had an inquiry been made into the boy's general health, the dentist would have adopted a different procedure. The dentist should feel no temerity in inquiring into his patient's history to determine the probable presence or absence of disease, and as we have said before, when extensive and conservative work is to be done, it may save the dentist considerable chagrin, later on, if he consults with the patient's physician when any indications of disease are found.

SUMMARY

1. The separation of dentistry from medicine has resulted in a tendency for the dentist to lose sight of general pathologic conditions and for the physician to fail to be on the alert for dental diseases.

2. The physician is urged to make an examination of the teeth a part of his routine and, whenever suspicious teeth are found, to request the opinion of a dentist. Furthermore, he should realize that he is not trained nor expected to give final advice about the teeth without consultation with a dentist.

3. The dentist, when consulted in this manner, should give a careful, conscientious opinion as to the presence both of actual disease and of possible infection. He also should not hesitate to condemn his own work, should it be necessary.

4. The physician should urge dental care whenever the mouth is found in an unhygienic condition.

5. The dentist will promote his patient's health by suggesting a medical examination whenever systemic disease is suspected. He can also be a powerful influence in advising his patient against the charlatans of medicine.

6. When extensive conservative dentistry is to be done, the dentist should first determine the general health of his patient.

Such cooperation as is here outlined will result in better dentistry, better medicine and, inevitably, in better health for the patient.

EXAMINATION OF THE MOUTH—WITH SPECIAL REFERENCE TO PYORRHEA*

By F. V. SIMONTON, D.D.S., San Francisco, California

IT IS desirable in practice and necessary in research to determine with precision the extent of destructive changes which have taken place in pyorrhetic conditions. These data will then serve as criteria for estimating degrees and rates of subsequent improvement or destruction.

The most satisfactory method open to us, in our present state of knowledge, for diagnosing conditions of pyorrhea, consists in measuring the distances, gingivo-apically, to which detachments of periodontal membrane have progressed.[1] Clinical manifestations of pyorrhea differ markedly: some cases show congestion, some anemia; in some, the roots of the teeth are exposed by recession of the gums; in others, the gums appear normal in form, color and position of the gingival margins; in some cases, the alveolar process is sound and firm, in others it may be boggy and infirm; sometimes, the teeth are secure, sometimes, loose. In view of these variations, it is evident that the most reliable and fundamental judgment of the degree of involvement in a case lies in the measurement of detachments.

The following studies were undertaken primarily in response to a need which early became apparent in conducting research on pyorrhea. The method to be presented has not been restricted to records of this disease, but has been carried through to be sufficiently inclusive to serve the requirements of the general practitioner.

There are two general methods of determining the condition of teeth and their investing structures. The first is by observation, instrumental tests, palpation, application of miscellaneous diagnostic devices, etc., and the second by roentgenographic examination. These methods are mutually supplemental.

INSTRUMENTAL EXAMINATION

The instrumental examination of pyorrhetic lesions consists in measuring the extent of destructive changes in the investing tissues.

In developing this method, careful attention was given to studies by other investigators, notable among whom was G. V. Black.[2] The measurements are made with periodontometers.[3] We have adopted this word after considerable thought, although reluctant to add to the nomenclature. The term is descriptive and convenient. We are indebted to G. M. Calhoun, associate professor of Greek, University of California, for the authentication of the word and its pronunciation.

*From the California Stomatological Research Group (Dental Section).

*Aided by grants from the Carnegie Corporation of New York, the American Dental Association and the Associated Radiograph Laboratories of San Francisco.

1. This statement is made after due consideration of the histopathology of this and allied conditions. It should be borne in mind that this paper deals with clinical diagnosis.

2. Black, G. V.: A Work on Special Dental Pathology, Edition 1, Medico-Dental Publishing Co., Chicago, 1915, pp. 447-459.

3. Pronounced per-i-o-don-tom'-e-ters.

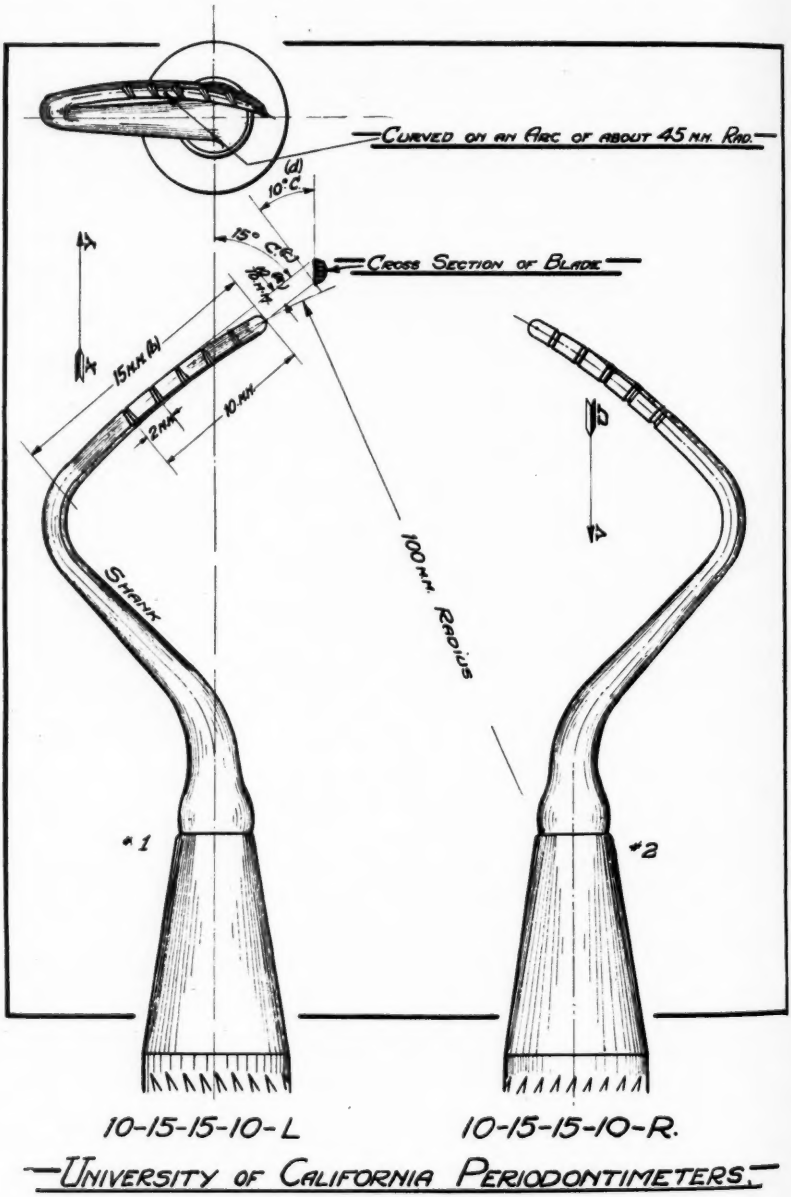


Fig. 1.—Periodontometers.

PERIODONTOMETERS

The periodontometers, as perfected by Drs. W. H. Hanford and C. O. Patten, consist of a pair of the formulas 10-15-15-10-*R* and 10-15-15-10-*L* (Fig. 1). These formulas were devised after the method of Black. The first number (10), Figure 1 (*a*), indicates the width of the blade in tenths of a millimeter; the second number 15(*b*), represents the length of the blade in millimeters; the third number, 15(*c*), indicates the angle, in degrees centigrade, which the blade makes with the axis of the handle, and the fourth number, 10(*d*), indicates the angle of deviation of the face of the blade measured across its width (at its center) from the plane of the shank.

It will be noted that these instruments are not exactly opposites, but that the face of No. 1, Figure 1, is directed upward, i.e., direction *x y*, while that of No. 2 is directed downward, i.e., direction *u v*.

The blades are notched at intervals of 2 mm. for a distance of 10 mm. The notches are carried entirely around the blades. It has been found that markings at lesser intervals than 2 mm. are difficult to read. They are also unnecessary, for after a little practice one can estimate millimeters and even fractions quite accurately.

These instruments have been thoroughly tested in practice and will reach any point on the surfaces of the roots of any of the teeth within the limits of rational treatment.

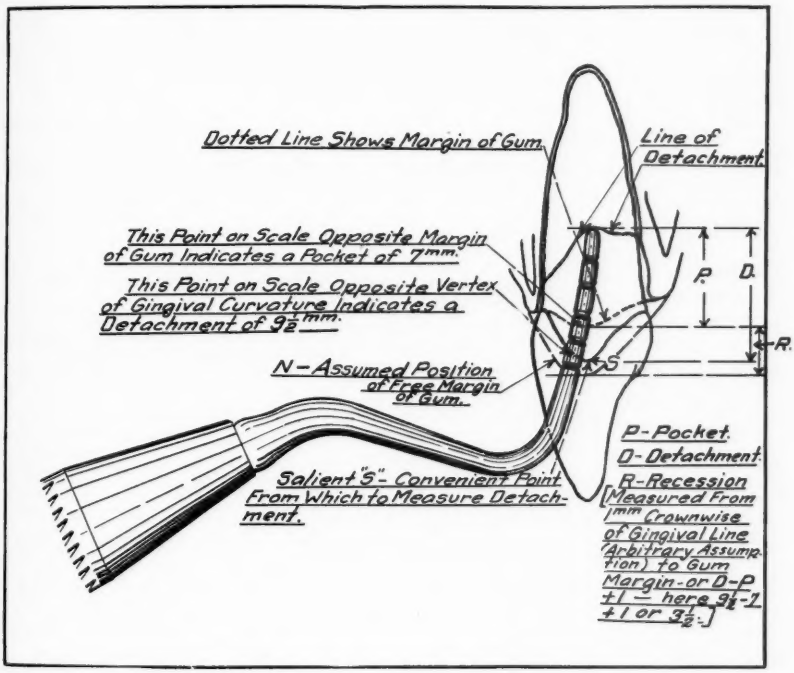

Dotted Line Shows Margin of Gum.
Line of Detachment.
This Point on Scale Opposite Margin of Gum Indicates a Pocket of 7mm.
This Point on Scale Opposite Vertex of Gingival Curvature Indicates a Detachment of 9½mm.
P.
D.
R.
S
N-Assumed Position of Free Margin of Gum.
P-Pocket.
D-Detachment.
R-Recession [Measured From 1mm Crownwise of Gingival Line (Arbitrary Assumption) to Gum Margin-or D-P +1 — here 9½-7 +1 or 3½.]
Salient "S"- Convenient Point From Which to Measure Detachment.

Fig. 2.—Method of making measurements with periodontometers.

MEASUREMENT OF DESTRUCTIVE CHANGES OF THE INVESTING TISSUES

According to the nomenclature recommended by Hanford, a detachment represents the loss of periodontal membrane that takes place, as measured gingivo-apically, along the root surface; a pocket is the space that intervenes between the denuded root surface and the circumjacent investing tissues, and a recession signifies the apical retrogression of the free margin of the gum from an assured normal (Fig. 2 at *N*).

DETACHMENT

A detachment is measured from the gingival line, where the attachment of the periodontal membrane normally terminates, to the bottom of the pocket or to the line that marks the apical limit of the destruction of the periodontal membrane. It is measured in the direction of the long axis of the root and very nearly along the center of the given surface (Fig. 2 [*D*]). Wherever possible, the measurements are made from salient points on the gingival line, e.g., the apices of the curvatures of the gingival lines on proximal surfaces of the anterior teeth (Fig. 2 at *S*), or the points which sometimes mark the peak of the gingival curvatures on labial or buccal surfaces, etc.

POCKET

The depth of a pocket is measured from the line that marks the apical limit of the destruction of the periodontal membrane to the margin of the gum (Fig. 2 [*P*]).

RECESSION

The recession can be calculated from the two preceding measurements. If the free margin of the gum is assumed as overlapping the enamel to the extent of 1 mm., then the recession would be, detachment—pocket+1=recession. For example, if a detachment is 9.5 mm., and the accompanying pocket 7mm., the recession would be 9.5—7+1 or 3.5 mm.

Of these three measurements, that of detachment is of the greatest value, for, as we observe the disease in our cases, the line of detachment or the bottom of the pocket changes but slowly. The position of the free margin of the gum, on the other hand, may vary markedly in a brief time. The calculation of the amount of recession, since it involves an arbitrary assumption (i.e., assumed normal overlap of gum), is the least accurate of the three.

The method of making these measurements will be best understood by considering a specific case; for example, the mesial surface of an upper central incisor (Fig. 2).

The location of the gingival line is first determined either by observation, confirmed by tactile exploration with the periodontometer when the gingival line is visible, or by instrumentation and tactile sense alone, when the gingival line is not visible. Where a suitable salient such as *S* in Figure 2 exists, it is utilized as a point from which to measure.

The tip of the periodontometer is passed from this point apically along the root, as nearly as possible parallel to its long axis, until the bottom of the pocket is reached. The location on the blade nearest the point on the gingival line from which the measurement was started indicates the detachment (in this case 9.5 mm. and a small fraction). The location on the scale opposite the free margin of the gum indicates the depth of pocket (in this case 7 mm.).

RECORD OF DETACHMENTS AND POCKETS

The extent of detachments and pockets is indicated on the examination chart as follows: Referring to Figure 3, the narrow bordering rectangle to the right of the rectangle which encloses tooth 1 (upper right) receives the record of the condition of the investing tissues at

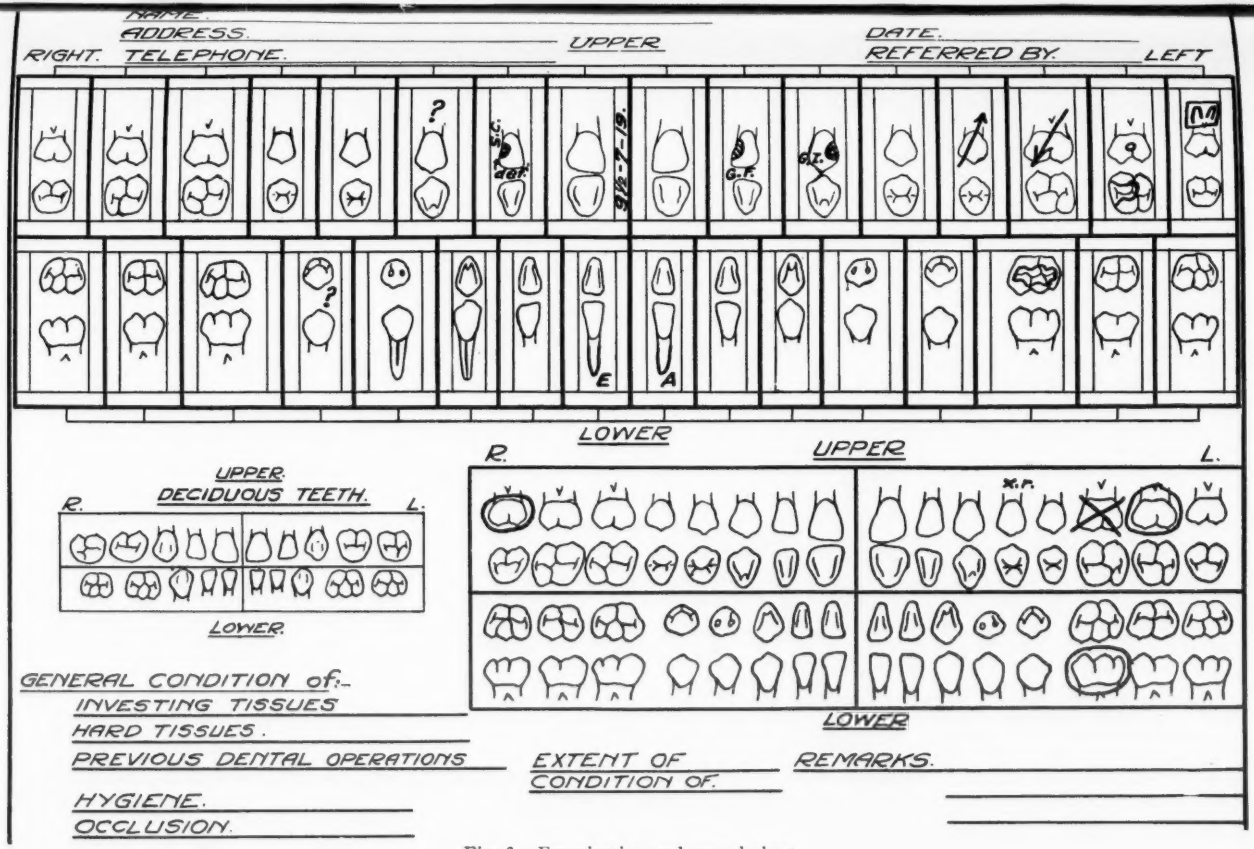


Fig. 3.—Examination and record chart.

Table 1—Code

Detachments of Periodontal Membrane

1 to 15, depths of pockets in millimeters measured with periodontometers

Conditions of the Investing Tissues

16. Open contact, no inflammation
17. Recession of gingiva, cause not apparent

Inflammation Due to

18. Salivary calculus deposits
19. Serumnal calculus deposits.
20. Lack of Contact of Teeth
21. Separations following extractions
22. Abnormalities of occlusion
23. Uneven occlusal wear
24. Weak contact
25. Proximal decays
26. Fillings or crowns
27. Loss in width of neighboring space
28. Detachment of transseptal fibers
30. Improper Contact of Teeth
31. Abnormal forms of teeth
32. Malpositions of teeth
33. Interproximal wear
34. Improperly finished fillings and crowns.
40. Deviations From Normal Contour
41. Sharp edges of cavities
42. Imperfect margins of fillings
43. Imperfect margins of crowns
50. Abuse in Dental Operations
51. Injuries with ligatures
52. Injuries with finishing, instruments and tapes
53. Failures to remove ligatures and pieces of rubber
60. Lack of Cleanliness
61. Lack of natural cleaning in mastication
62. Lack of artificial cleaning.
70. Errors in Cleaning Operation
71. Misuse of toothpicks
72. Misuse of rubber bands, silk floss
73. Injuries with toothbrush

Conditions of Pulp, Etc.

T Treatment required without reference to condition
N Normal
H Hyperemia
E Exposed and alive
D Dead
R Previous root fillings
A Acute alveolar abscess
C Chronic alveolar abscess

Roentgenograms

small letter x, r.

Operations

(existing or to be performed)

Sketches and letters as follows:

G.F. Gold Foil
G.I. Gold Inlay
S.C. Silicate Cement
P.I. Porcelain Inlay
C.B. Crown and Bridge Cement
G.P. Guttapercha
G.C. Gold Crown
P.V. Partial Veneer Crown
P.J. Porcelain Shell Crown
R.C. Richmond Crown
S.C. Standard Crown
D.C. Davis Crown
L.C. Logan Crown
G.P. Gold Pontic
P.P. Porcelain Pontic

Partial denture. Vertical line through each tooth and these lines joined

Clasp. Crescent at gingival of tooth clasped, joined to vertical line corresponding to tooth (on partial denture) adjacent to tooth clasped

Full denture. Write same on examination chart

the mesial surface. The first figure (9½) indicates the detachment. This is followed by a dash and a second figure (7), which indicates the pocket; this, by a dash and a third figure, which indicates, according to the code, the estimated cause,—19 in this case, signifying serumal calculus.

Examination and Record Chart.—Figure 3 shows the examination and record chart. It is similar to that advocated by A. D. Black. Modifications consist in the increased size (8½ by 11 inches) of chart; the inclusion of diagrams of the teeth; the addition of a fifth (central) rectangle for each tooth; certain alterations in symbols and notations, and in the addition of a chart for the deciduous teeth and an additional chart for the planning of the case. The method of making a complete record of the conditions of the teeth and investing tissues may be readily comprehended by a study of Figure 3 in conjunction with the code (Table 1) and the following description.

Conditions of teeth, root-canals and apical spaces are recorded in the central rectangle for each tooth, in which are the tooth diagrams. Conditions of the investing tissues are noted in the narrow bordering rectangles.

The numbers 1 to 15 have been reserved to indicate detachments, pockets and recessions. The numbers from and including 16 are used according to the code to indicate the estimated causes of pathologic conditions of the investing tissues (after A. D. Black). Sketches are used to indicate pathologic conditions of, and operations performed on, the hard tissues. These sketches are left unshaded to show pathologic conditions, are hatched to indicate existing operations and are filled in to represent operations performed. Letters are used in conjunction with the sketches indicating operations to show the type of operation. Two capital letters are used together for this purpose, single letters being reserved to indicate root-canal conditions.

PATHOLOGIC CONDITIONS

Cavities.—These are indicated by sketching on the tooth diagram the type of cavity preparation indicated; thus, tooth 6 (lower left) presents a simple occlusal cavity; tooth 7 (upper left), a mesioclusal cavity and a buccal pit cavity.

Missing Teeth.—Tooth 5 (upper left) is indicated as missing. The arrow pointing in the direction of the root signifies that the tooth is "out—in the direction of the root," i.e., has not erupted (delayed eruption or failure of tooth germ). Tooth 6 (upper left) is "out—in the direction of the crown," i.e., has been extracted as shown by the arrow directed crownwise (after W. H. Hanford). Root ends are indicated by sketching in the roots and enclosing them in a rectangle [Compare tooth 8 (upper left).]

Conditions of Investing Tissues.—These conditions are designated as previously described—noting detachments, pockets and estimated causes. The estimated causes are designated by the proper numbers according to the code; thus, 41, sharp edge of cavity; 62, lack of artificial cleaning, etc.

Root and Apical Conditions.—These are indicated by sketching in the root and by suitable letters in accordance with the code (after A. D. Black); thus tooth 1 (lower right) presents an exposed pulp, tooth 1 (lower left) an acute alveolar abscess, etc. Teeth whose possible extraction is under advisement, or prognosis of whose condition is unfavorable, are marked thus: (?) [Compare 5 (lower right), 3 (upper right).]

Atrophy, Abrasion and Erosion.—These conditions are indicated in writing adjacent to the diagrams with arrows pointing to the teeth affected, or written under "Remarks," using symbols to indicate teeth; thus, Erosion

TABLE 2—CHART

Name Business Address Residence Address

Referred by Telephone Telephone Estimate

Date	No. of Oper.	OPERATION	Time	Dr.	Cr.	Date	No. of Oper.	OPERATION	Time	Dr.	Cr.

2 (lower right), 1 (lower right), 1 (lower left), 2 (lower left), 3 (lower left).

General Conditions.—These are noted under appropriate headings.

EXISTING OPERATIONS AND OPERATIONS PERFORMED

These may be recorded, if desired, by sketching in outlines representing filling operations, crowns, bridges, etc. These outlines are hatched to indicate existing operations and filled in to represent operations performed. Letters used in conjunction with these sketches indicate the type of restoration; thus, tooth 2 (upper left) presents a gold filling. That this is an existing operation is shown by the hatching. That it is a gold foil filling is shown by the letters G. F. If it were a gold inlay, the letters G. I. would be used. S. C. would indicate a silicate cement; G. S., a gold shell crown; G. P., a gold pontic; P. P., a porcelain pontic, etc. (Compare code). A defective operation, where replacement is desirable, is shown by hatching in both directions. [Compare tooth 3 (upper left).] If the sketch is so small as to make this obscure, the syllable "def.," may be used for defective. [Compare tooth 2 (upper right).] Root fillings are shown by completing the root on the diagram and drawing a heavy line down the center. If the root filling as it exists or as it is placed fails to reach the end of the root, the length of this center line can be made to correspond. [Compare teeth 3 (lower right), 4 (lower right).]

CHART FOR PLANNING

The smaller chart below and to the right of the main chart is to be used for planning the case. Missing teeth are shown by enclosing same in circles or by arrows as used on examination diagram. [Compare 7 (upper left), 8 (upper right), 6 (lower left).] Extractions to be performed are indicated by a cross. [Compare 6 (upper left).] Operations are denoted by the same means as is used in the larger chart. Teeth to be examined by roentgen ray are marked with small letters x, r, [Compare 4 (upper left).]

A chart for the deciduous teeth appears below and to the left of the main chart. The code is printed on the back of the examination chart.

SERVICE CHART

The type of service chart shown in Table 2 is recommended. This is printed on a card the same size as, but separate from, the examination chart. The record form is printed on both sides of the card. Notations made on this record should be written in full or clear abbreviations should be used, in preference to initial letters. (Extensions for accounting purposes involve other forms not a part of examination and service records.)

FOLDERS

We recommend that the examination and record charts, roentgenograms, correspondence and any further data be kept in a standard folder properly inscribed with patient's name and arranged in alphabetical order.

The use of folders has been found very satisfactory. They are neat, safe, easily accessible, and above all, make it possible to preserve the complete data concerning each patient separately and independently.

THE RELATION OF DENTISTRY TO OBSTETRICS

By JOHN E. TALBOT, M.D., Worcester, Massachusetts

THE subject of foci of infection in the teeth in their relation to disease has been so tremendously abused in the last few years that one must feel some hesitation in advancing new theories in this branch of medical science. However, it is my belief that chronic infection is a prolific source of systemic disease. The foci in association with teeth are only a part of this great problem.

The work of Pasteur established beyond all question the true relation of bacteria to many diseases. Since his time, it has been the more acute and spectacular diseases, so to speak, which have received the greatest attention of investigators. In the study of acute diseases, it has been found that many are distinct entities, that certain units or associations of clinical symptoms are caused by distinct and specific organisms or bacteria. It has also been demonstrated that infectious disease is an acquired phenomenon, that the disease results from the invasion of the human tissues from the outside by these bacteria. The treatment of disease has centered around two main points: (1) the prevention of the invasion of the human system by pathogenic bacteria, and (2) measures that will successfully assist Nature in combating the disease once it has gained a foothold.

MacKenzie[1] has pointed out that the portals of entrance of the invading pathogenic bacteria and the symptoms attendant on their entrance into the tissues are the most important features in the further study for the advance of medical science. If the point of entrance can be recognized long enough before the disease becomes systemic, eradication of the primary focus will prevent the systemic sequelae.

It is clearly recognized that systemic disease and the resultant death of an individual from infectious disease are dependent on the migration of the invading bacteria from the point of entrance. Thus, the damage to a heart that results from an attack of tonsillitis is brought about only by a direct attack on the heart by the bacteria that have entered the system through the tonsil. Likewise, one does not die from the infection that is confined in the acutely inflamed appendix, but by its spread to the peritoneal cavity. These two examples show that the primary focus or point of entrance is not the vital factor, but that death results from the migration of the bacteria from the primary focus either by the hematogenous or the lymphatic route, or by direct extension.

It is apparent that the determination of the point of entrance and the proper treatment of this primary focus, when known, is of the greatest importance in the treatment of all infectious diseases, and this is true whether the disease is of the acute or of the chronic type. The prevention of the entrance of bacteria into the human system and the proper treatment of the point of entrance before the disease becomes systemic comprise preventive medicine.

The principles that govern the prevention of diseases due to chronic infec-

1. MacKenzie, James: The Future of Medicine, New York, Oxford University Press, 1919.

tion are no different from those in acute infection. The abscess at the end of a tooth root or the chronic infection in the tonsil are merely known points of entrance of pathogenic bacteria. The bacteria in these foci have gained entrance into the tissues of the body. No harm to the system results until they migrate to other and more vital parts of the system. It is, therefore, not the actual focus of infection that is the source of danger in this condition, but the probability that the infection may migrate and one or more organs of the body may become partially or completely incapacitated.

The principles of preventive medicine demand methods not only to prevent the entrance of pathogenic bacteria into the tissues of the body but also to insure their immediate eradication when known. In this department of preventive medicine, dentistry can do an untold amount of good to the human race.

My interest in the relation of chronic infection (focal infection) to obstetric complications was stimulated early in 1917 by the development of a severe toxemia in a woman who had been exceptionally healthy up to that time. She had not even had the usual array of children's diseases. It seemed quite unreasonable that a woman with a negative history and negative physical examination should not be able to carry her baby without harm to herself. Neuralgia in the right shoulder and arm and the dropping of mucus in the back of the throat were symptoms associated with the toxemia at its height. Five months after delivery, the blood pressure, which had returned to normal immediately after the birth of the baby, began to rise. When it had reached 160, an acute abscess developed on a gold crowned tooth, with involvement of the antrum. The fact that the symptoms of neuralgia and catarrh in the presence of the toxemia could be associated with this focus of infection raised two questions in my mind: first, did not the symptoms of neuralgia and catarrh signify that this focus of infection in the teeth was active at the time of the toxemia, and, secondly, can toxemia of pregnancy, which is also associated with a rising blood pressure, be caused by the activity of chronic infection in the system of the pregnant woman? The relation of cause and effect between septic teeth and tonsils and many neuralgias and catarrhal conditions has been thoroughly established. How can we better explain the onset of these symptoms than by attributing them to an increase in the activity of these foci of infection that have often been present a long time without symptoms?

Constant observation on this second point, namely, the association of chronic infection with toxemia of pregnancy, has convinced me that foci of chronic infection are always associated with toxemia of pregnancy. These foci are not always to be found in association with the teeth, however. The tonsil is as frequently an offender as the teeth, and very frequently both share the responsibility.

In 1919, I published a paper[2] reporting the association of chronic infection in the teeth with toxemia of pregnancy and endeavored to explain the relationship on the generally accepted theory of a toxin in the blood of a pregnant woman. In that paper, I reported an article by La Vake of Minneapolis, published in 1916, who also called attention to the constant association of a focus of chronic infection with the convulsive stage of toxemia of pregnancy.

The mere finding of foci of chronic infection in constant relation with toxemia of pregnancy and eclampsia does not prove any etiologic relationship. However, in studying the disease from

2. Talbot, J. E.: A Theory on the Etiology of Toxemia of Pregnancy With or Without Convulsions, Surg., Gynec. and Obst., 28: 165-174 (Feb.) 1919.

this point of view, it was not long before much suggestive clinical evidence came under observation.

In the first place, De Lee of the Chicago Lying-In Hospital has pointed out that the toxemia of pregnancy and eclampsia has many of the earmarks of an infectious disease. For instance, patients dying of eclampsia almost universally have a considerable degree of fever. Bronchopneumonia is not uncommonly a terminal event of this disease. The disease has a marked increase in seasonal incidence during the winter and spring months. Some tendency to an epidemic form has been noted. Kellogg,[3] of Boston, has recently pointed out that, in a large study of cases at the Boston Lying-In Hospital, 2.5 per cent of nontoxic pregnant women show fever following delivery; 12 per cent who have been toxic show fever, and 25 per cent who have had convulsions show fever, regardless of the method of delivery. This evidence tends to show not only the incidence of outspoken systemic infection but also the graded potency of the infection in the presence of toxemia and eclampsia.

Besides this evidence, it has long been recognized that the onset of toxemia of pregnancy may be precipitated by an acute infection such as a cold or sore throat. In keeping with this evidence, I have observed many times that the rise of blood pressure, which is generally the initial sign of approaching toxemia, is associated with or just preceded by neuralgic symptoms in the face, neck or shoulders. If these symptoms of neuralgia can be interpreted as signs of activity in an infected tooth or tonsil, and no one realizes this association any more than does the dentist, then we can realize the analogy between the toxemia precipitated by the cold or sore throat and the one precipitated by the activity, the acute exacerbation, of the chronic focus of infection in association with the tooth or tonsil. Do not get the impression that toxemia of pregnancy is always or even in the majority of cases ushered in by a cold or an attack of neuralgia. Neuralgias are, however, of sufficiently frequent occurrence in association with toxemia of pregnancy always to be enumerated in the textbooks among the symptoms that go to make up the entity of toxemia of pregnancy.

Toxemia of pregnancy is a systemic disease. The liver is the organ most consistently injured, and the kidneys are next. In severe cases of eclampsia, when the disease has been sufficiently severe to cause the death of the individual, the brain, the lungs, the heart, the pericardium and pleura, as well as other organs, show damage. Minute hemorrhagic areas are the most characteristic early lesions, and minute areas of thrombosis and necrosis represent the sequelae of these minute hemorrhagic areas.

In order to determine the etiologic relationship between these areas of chronic infection so constantly found in association with toxemia of pregnancy, it has been my endeavor to make observations that will establish, if possible, this etiologic relationship. As has been stated above, no focus of infection is going to cause systemic disease until the pathogenic bacteria migrate from the primary focus by either the hematogenous or the lymphatic routes, or by direct extension. What evidence is there, therefore, that pathogenic bacteria migrate from foci of chronic infection during this disease?

Warnekros has succeeded in obtaining eighteen positive blood cultures, in twenty-five examinations in cases of toxemia of pregnancy. This evidence would be almost conclusive if such a percentage could be maintained. However, this evidence has not been supported in my own experience. It is

3. Kellogg, F. S.: Relationship Between Toxemia of Pregnancy and Uterine Sepsis from a Study of 400 Toxemic Cases, Am. J. Obst. and Gynec., 3: 366-377 (April) 1922.

also true that the disease does not present those symptoms which we have been led to associate with a septicemia. Although the disease does not resemble septicemia, there is still the possibility that bacteria may pass into the blood stream, not in sufficient numbers to cause a general blood infection, but in lesser numbers, such as small showers of bacteria, so to speak, and that these repeated showers or small emboli of bacteria may attack and injure various organs in the body by the slow process of more or less constant repetition. This process may even be graded off to a single embolus of pathogenic bacteria which, if entrance to the tissue of some organ is gained, may result in a small miliary abscess. Such a conception of the process by which foci or infection cause systemic disease will explain the frequency of negative blood cultures when the only clinical explanation of the condition found is the hematogenous infection theory.

In obstetrics, the placenta, an organ constantly bathed with maternal blood, offers an excellent opportunity for the study of this problem. It must be remembered that the blood stream of the mother and that of the baby do not mix. They are separated by the villous membrane, through which oxygen and food material for the nourishment of the baby pass in one direction and the waste products pass in the other direction.

The most common pathologic condition to be found in the placenta is known as infarction. The great frequency with which infarcts are found in the placenta in association with toxemia of pregnancy has given rise to the belief by many that they are the source of the toxin that causes the disease of toxemia. Young of Edinborough claims that it is the products of autolysis from these infarcts that constitute the toxic element in the blood of the pregnant woman. However, this theory is not consistent with the findings that the degree of toxemia has no relation to the amount of infarction present and that more than 80 per cent of placentas are infarcted, while the incidence of toxemia is between 12 and 20 per cent. Most cases of toxemia tend to recur in subsequent pregnancies, and this fact indicates that the primary cause is some factor persisting throughout the childbearing period.

Pathologists describe the infarct as a hemorrhagic lesion in the beginning. Later, by a process of evolution, described as coagulation necrosis, it becomes a hard white lesion, varying in size from that of a millet seed to several centimeters in diameter. Lesions in different stages of development may be found in the same placenta, showing that the cause of the lesion must be equally recurrent. The majority of infarcts are to be found on the edge of the placenta.

Infarcts have been suspected as being infectious in origin for many years, but endeavors to find bacteria in them have not been of sufficient success to prove the point. This evidence does not prove that they are not infectious in origin, however. It should be remembered that the infarct is a lesion in the placenta on the fetal side of the villous membrane. The infection, if borne by the maternal blood vessels, would naturally be in the maternal blood vessels of the placental site. In confirmation of this point, I have found reports of the examination of two placentas *in situ* in the uterus, and in both miliary abscesses were found in the uterine tissues beneath the infarcted placenta.

A clinical method for establishing the association between infection in the head and the beginning infarct occurred to me. A normal placenta will enlarge concentrically by proliferation of tissue on its edge, and has the cord attached to the center of a circle formed by the edge of the full term placenta. The point of cord attachment represents the beginning of the pregnancy. The edge of the placenta that is farthest from the

point of cord attachment represents the most recent tissue grown. Should any injury occur to the edge of the placenta at the end of the first month, this proliferation of the edge would be stopped and compensatory growth would take place on the uninjured edge. This would result in a full term placenta with the cord attached very near the edge or a placenta of the typical battledore type. By deduction, it is clear that the distance from a point of injury on the edge of the placenta to the point of cord attachment will give an estimate as to the time in the pregnancy when such injury originated.

In order to establish this point, bleeding spells during pregnancy were considered, as marking some injury to the edge of the placenta. It must be clear that any blood issuing from the placental site must involve and injure the proliferating edge of the placenta. A series of more than fifty cases has shown that bleeding spells during pregnancy are recorded on the edge of the placenta by contemporaneous infarcts and cessation of growth of the placenta at the injured point. It is possible to describe, before the birth of the placenta, the distance from the point of cord attachment to the edge of the placenta.

It is well recognized that bleeding spells in pregnancy are frequently immediately preceded by both severe and mild infections. This clinical association suggests strongly that this bleeding spell is the result of the infection. As I have shown, after bleeding spells, infarcts are left on the edge of the placenta. If the bleeding is caused by the infection, infarcts without bleeding may be due to infection. To establish this point, I have observed more than sixty cases in which acute infection has been recorded on the placenta by contemporaneous infarcts. Two of these cases were of especial interest, one being a lobar pneumonia at the fourth month in a pregnancy that fortunately went on to full term; the other was a case of an acute abscessed tooth without any other infection occurring in the pregnancy. The abscess occurred ten weeks before the birth of the baby and was recorded on the placenta by a contemporaneous infarct.

From a clinical standpoint all this evidence indicates that the infarct is infectious in origin and that it is the result of hematogenous infection of the maternal blood vessels of the placental site.

This is a very important point; for, from the frequency with which infarcts are found in the placenta, the frequency of the occurrence of infection through the blood stream of the pregnant woman can be determined. This frequency is not out of proportion to the incidence of foci of acute and chronic infection in pregnant women. To claim that bacteria migrating from foci of chronic infection will cause the same lesions that are caused by bacteria from foci of acute infection is only logical.

Having established the fact that the placental infarct is due to hematogenous infection of the mother from foci of acute or chronic infection, many reasonable deductions may be made as to much of the pathology associated with obstetrics. This pathology is then easily divided under two heads: (1) the damage done to the organs of the mother and (2) the damage done to the placenta and the baby.

Under the first head hematogenous infection will explain the cause of many cases of breast abscess and pyelitis. It is my belief that it will also explain the cause of toxemia of pregnancy. As pointed out above, the characteristic lesions in the organs of a woman dying of eclampsia are minute miliary hemorrhages in the liver, kidneys, brain, pleura, pericardium, heart and other organs. The similarity of this miliary hemorrhagic lesion to the lesion of the beginning infarct is significant. Thrombosis and focal necrosis are sequelae of both lesions. It must be remembered

that the bacteria causing these lesions are chronically present and of low grade virulence. Their damage is wrought more by repetition of minute injuries that do not produce symptoms until the capacity of the organ attached is brought below the needs of the system. This conception of the disease will explain the insidious onset of most cases of toxemia, as well as the fulminating case. It explains the impressive frequency of occurrence of the much infarcted placenta with toxemia, and also the great variety of pathologic conditions that are found in the fetus in association with toxemia.

It cannot be here explained in detail how the presence of an infarcted placenta can cause premature births, stillbirths, and undernournishment, deformity and hemorrhagic disease of the new born. It is, however, not only possible but even probable that many instances of the above named complications can be traced to a septic gold crown, or a pivot or devitalized tooth. In one of my cases, streptococci were recovered, in a case of miscarriage at four months, from pus from the gums, in association with crowned teeth and bridgework; from the urine of the patient, and from the baby's heart blood. The passage of bacteria from the mother to the baby before birth is well known, *Spirochaeta pallida* being the best known example. If one kind of bacteria can make this journey, bacteria of any kind can do the same thing, given similar conditions of virulence and lack of tissue resistance.

The picture that this clinical evidence displays is one which is appalling when we consider in relation to it the tremendous prevalence of chronic infection in the teeth and tonsils. The mortality from eclampsia is between 20 and 25 per cent, and the mortality rate for fetal and infant deaths that can be traced to toxemia of pregnancy is even higher. Watchful prenatal care of the pregnant woman will reduce this heavy death rate in both mother and babies, but it will not prevent the incidence of the toxemia of pregnancy unless the cause is removed before the disease becomes systemic. It is my belief that the dentists have it within their power to be of the greatest service as regards the welfare of the pregnant woman. Not only must they be watchful to discover foci of infection and eradicate them, but they must also do all in their power to adopt methods in the treatment of the teeth that will not result in the formation of these foci of infection.

The treatment of toxemia of pregnancy by the removal of foci of infection in the presence of the disease gives variable results. In one of my cases, the blood pressure dropped from 190 to 140 and remained so for three weeks, until the baby was delivered. Others have reported similar results. Many cases do not respond, and some cases are made worse. This evidence is entirely in keeping with the results obtained in other conditions that are attributed to foci of infection.

It must be remembered that the extraction of an infected tooth may change a mild chronic infection into an active one. It is my belief, and I have cases to support this belief, that there is a real risk of aggravating the toxemia by the removal of septic teeth in the presence of a severe toxemia. The moment infection becomes active, the danger of systemic damage is increased. That there is not more trouble from extractions is due to the drainage obtained by the extraction.

Many cases present so many infected teeth that it is practically impossible to render the patient free from infection in the presence of the ascending systemic strain of pregnancy. Many cases present both septic teeth and septic tonsils. It is, I believe, extremely rash to try to clear up such cases in the presence of a toxemia.

Another period in pregnancy during which septic teeth should be left alone,

if possible, is the first three months, and especially the first two months. As I have shown above, active infection, or the acute exacerbation of chronic infection, may cause bleeding from the placental site by hematogenous infection of the material blood vessels of the placental site. It is during the first two months of the pregnancy that deformities develop. In a series of twenty-five deformed babies, damage to the placenta was shown within the first two months. In other words, if an infectious injury occurs to the placenta within the first two months deformity may develop. Mall[4] has pointed out that the fetus is deformed in nearly 50 per cent of uninduced miscarriages. He also points out that only one deformed baby in twelve goes to full term. Deformity of the embryo is, therefore, much more common than is generally recognized. This evidence emphasizes the importance of doing everything possible to avoid active infection during this period, and I believe the dentist should not only avoid all extractions of infected teeth at this time, but he should also avoid treating an apical infection through the root-canal. Treatment of apical infection, although directed to stopping the infection, has, in my experience, on some occasions, increased the activity of the infection. Damage may result from such a procedure. In one of my cases, a miscarriage resulted; in two cases, bleeding, and in a fourth case fever developed with intractable vomiting, which necessitated termination of the pregnancy. A fifth patient had been vomiting for three weeks before I saw her. The onset of the vomiting occurred three days after a root-canal had been filled. Severe neuralgia of the head and face was also present. A roentgenogram, which had not been taken before the canal filling, revealed a large apical area. Removal of the tooth aggravated the symptoms for the first two days, but the patient was able to eat a normal diet in one week after the date of the extraction. Rowley at the Mayo clinic has reported good results from the removal of infected teeth and tonsils in the treatment of vomiting of pregnancy.

I agree with La Vake that it should not be the duty of the obstetrician to remove these foci of chronic infection. They should be removed before the woman becomes pregnant or between pregnancies. This point of view is supported by several cases that I have observed in which there were no infected teeth and the tonsils had been removed. In these cases, the patients have passed through normal pregnancies. It is also supported by those cases that I have had the opportunity to clear up before the next pregnancy.

CONCLUSION

The old saying that "a woman should not have dentistry done during pregnancy" has some foundation in fact, but the danger is entirely confined to the presence of infection. The dentist should see the pregnant woman oftener than usual so that he can keep her gums in good condition and prevent the advance of caries and pyorrhea, which are so much aggravated by the pregnant state. Extreme care should be exercised not to carry out treatment that will tend to change dormant chronic infection to an active state. When such dentistry is deemed necessary, the best time for it is between the fourth and seventh month of pregnancy.

4. Mall, F. P.: Age of Human Embryos, Am. J. Anat., 23: 397 (March) 1918.

DENTAL ROENTGENOGRAPHY AS RELATED TO PARTIAL DENTURE PROSTHESIS

By E. W. BROWNING, D.D.S., Salt Lake City, Utah

(Read before the American Dental Association, Dallas, Texas, November 10-14, 1924)

THE main reason dental roentgenography has been used so extensively in the past is that it has been possible, even in inexperienced hands, to disclose granulomas and cysts at the apices of teeth. It would not be an exaggeration to say that 90 per cent of all roentgenograms have been taken with this as the objective. If roentgenography has been able to obtain and maintain so prominent a place in dentistry with the past methods, its limits are unbounded for the future. The real benefit that roentgenography has to offer mankind is not in disclosing granulomas on teeth that are already the same as lost members, but in disclosing beginning changes in the teeth and osseous tissue, thereby making it possible to prevent rather than cure.

There are probably a hundred more important reasons for taking roentgenograms than the disclosing of granulomas and cysts. Among the most important reasons is the discovery of beginning caries; overhanging fillings; pulp degeneration; length and breadth of roots, especially when they are to be used as abutments for bridges or partial dentures; periodontal lesions, tartar causing inflammation of the periodontal membrane; excementosis; pulp-stones; fractures; retained roots; proximity of roots to such important anatomic landmarks as the maxillary sinuses, the nasal cavity and the inferior dental nerve; unerupted impacted and supernumerary teeth, and, most important and least often observed, the condition of the osseous tissue, such as the bulging or destruction of the periodontal lamella, loss or partial loss of the osseous tissue supporting the tooth or teeth, and pathologic areas in bone due to retained infection following extractions and the calcium salt content.

If the dentist is to cooperate with the physician in maintaining the future health of the nation, you who are interested in partial denture prosthesis are placed in a position of the gravest kind of responsibility.

The most important part of medicine and surgery is not the contents, of the tablet or the operation, but the exact and unerring diagnosis. If that is true of medicine, it is likewise true that our most important service is not the beautifully constructed restoration, but the correct diagnosis and prognosis. If the surgeon performs a wonderful operation, removing the appendix in twenty minutes, and the real trouble was pneumonia, of what value was the operation to the patient, and what should the patient pay for such an operation? How long would an engineer for a large construction company hold his position if he placed the abutments of a bridge upon quicksand? Is it any wonder, then, that a large portion of the public have lost confidence in us as dentists

when all these years we have been placing restorations in the mouths of our patients upon foundations worse than quicksand? What do you think takes place in the mind of the patient, when shortly after paying for a beautiful gold inlay, the tooth becomes sore and the jaw swollen, and the tooth has to be extracted? Do you think the patient blames his or her neglect, or even blames the tooth? No, in at least ninety-nine cases of every hundred, the patient blames the dentist; and justly too, unless that tooth has been subjected to examination by roentgen-ray. We should also remember that in court we may not be convicted for a faulty diagnosis, but we can be convicted for neglect; and it certainly is neglect when we do not use everything at our disposal to make a correct diagnosis.

If this is true, then no diagnosis is complete without a complete denture roentgenogram. No matter how large or how small the contemplated restoration, it is essential that we first have a complete set of roentgenograms. The better men throughout the country today, before attempting a restoration, take impressions and mount study models upon an articulator. If it is necessary to know something about the opposing teeth, the occlusion and the little peculiarities of each jaw, then it is likewise necessary that we know something about the teeth and bone of the opposing jaw, and also something about the teeth and bone of the opposite jaw.

In the past, it has been considered sufficient, in taking a complete denture roentgenogram, to make from ten to fourteen exposures. This number of exposures in nearly every case is just half as many as should be made. The fact that our full mouth roentgenograms have been incomplete has caused several eminent writers to criticize the possibilities of the roentgen-ray as a means of diagnosis. One very capable lecturer lays considerable stress on the fact that the roentgenogram does not show the true condition, or at least does not tell the whole story. He emphasizes this by showing roentgenograms that apparently do not show a pathologic area and then a picture of the extracted tooth, showing a large granuloma attached. He is correct in his deductions, because the roentgenograms he had did not show the true condition. Yet, had the tooth been examined correctly and pictured from different angles, the condition that did exist would have manifested itself in the roentgenogram. In fact, in the past, most of our interpretations, if correct, have been due not to clear cut roentgenograms, but, in a great measure, to anticipation and intuition. A complete denture roentgenogram is incomplete and incorrect unless it shows clearly the crown and roots of each and every tooth, together with the surrounding osseous tissue. It must show the contact points in such a way that we get a view of the mesial and distal surfaces of every tooth without any overlapping. This requires many more exposures than we have been in the habit of making, and when a complete set of films is made, there will be more overhanging fillings shown, but it will mean better margins in the future. For restorative work, no complete denture roentgenogram would be complete without extraoral plates being taken with the teeth in occlusion. This is one of the best means of detecting traumatic occlusion. A complete set of roentgenograms should contain at least two views of every tooth. Often, beginning caries is detected from one angle, whereas it would not be seen from another angle.

The failure of many restorations lies not in faulty technic of the operator but in faulty and incomplete roentgenograms. In order to make a correct diagnosis, it is essential to have a good set of pictures of the teeth. The foundation upon which a building is built is more

important than the building itself; therefore a good set of films of the osseous tissue is more important than a picture of the teeth. The only reason for not making complete denture roentgenograms of every mouth is financial. If this is the case, then let us make certain that we at least film all of the edentulous spaces.

Dr. Boyd Gardner reports that of 10,000 patients examined in one year, one-third of those who had had dental extractions still had retained roots, as revealed by the roentgen-ray. But more important than the disclosure of retained roots are the indications as to the true condition of the bone. Reviewing a little anatomy as seen roentgenographically, we find outside the cementum the periodontal membrane, which roentgenographically is shown as a fine even black line, and outside the periodontal membrane is a fine shell-like layer of compact bone called the periodontal lamella, which roentgenographically is shown as a fine even white line. The normal periodontal membrane is different from the periosteum in the specific arrangement of its fibers, and in that it has two functions, an osseous function on the alveolar side and a cemental function on the cementum side. It contains on the bone side cells of regeneration and absorption; namely, the osteoblasts and the osteoclasts. On the cementum side, it contains cells of regeneration and absorption; namely, the cementoblasts and the cementoclasts.

Any activity of the periodontal membrane producing an absorption of the cementum activates the cementoclasts on the cemental side, and at the same time activates the osteoclasts on the bone side, producing an absorption of the process; likewise, any activity of the periodontal membrane producing an excementosis at the some time activates the osteoblasts, and we have as a result an added number of bone cells.

The periodontal membrane is the structure closest to the tooth, and the periodontal lamella is the bony structure closest to the tooth; therefore, before any disease process originating in the tooth can affect the alveolar process beyond, it must, first of all, show signs of its progress in the periodontal lamella. The periodontal lamella is continuous around all teeth not affected with pathologic changes.

The normal alveolar process is recognized roentgenographically by the cancellated structure irregularities being definite and clear cut and by the harmonious blending of the light and dark tones that make up the density. Because spongy bone is less dense than compact bone, the cancellations are shown to be more irregular; and as the maxilla and mandible are made up chiefly of spongy bone, it becomes an easy matter to recognize the normal. The harmony of shading of the light and dark tones depends on the calcium salt distribution in the bone tissue, it normally being distributed in a well-balanced uniformity. The calcium salt in bone does not permit the passage of the rays; therefore, a roentgenographic reproduction of the alveolar process becomes a reproduction of the calcium salt content. When there is a diminution of the calcium salts, the rays pass through more easily and affect the emulsion more deeply, producing a darker tone, or, more correctly, a radiolucency. When there is an increase of calcium salts, there occurs a resistance to the passing of the rays, which affect the silver in the emulsion with less intensity and thereby produce a lighter spot, a radiopacity. There is no pathologic change in bone tissue, especially of the spongy type, that does not affect the structure in some way. In a normal process, the distribution of calcium salt is well balanced; therefore, there are no localized spots of white or black indic-

ative of a decrease or an increase of calcium salts, because such a condition occurs only from pathologic influences.

Whenever an irritant affects living tissue, that tissue shows a defensive and protective reaction, known as inflammation. Inflammation and infection are not synonymous because inflammation is the result of one or more of five factors; namely, mechanical, chemical, thermal, electrical or bacterial. As it is possible to produce inflammation by other means than bacterial, all inflammation is not necessarily infective. Unhealthy tissue is always pathologic, but pathologic tissue is not always unhealthy. Pathologic tissue is abnormal tissue, a result of the normal attempting to adapt itself to an abnormal condition. When this abnormality affects the well-being of the individual, the tissue becomes unhealthy. Roentgenographically we can recognize pathologic tissue, but we cannot tell whether or not it is harming the patient. This must be determined by the clinical findings and by symptoms. It would not be unreasonable to presume that, if we have excessive shrinkage of the ridges, and the patient's illness dates to a period prior to dental symptoms, some metabolic disturbance of long standing must be considered.

We cannot deny that the roentgenogram reveals the above mentioned points in anatomy. Then, provided the technic employed in roentgenographing has been correct and exact, we are in a position to render our patients the greatest service possible. It is an established fact that certain forms of pyorrhea have long been recognized as being associated with diabetes, and the dentist, by recognizing the pyorrhea in his patient's mouth, has been able to send him to a physician probably years before he would otherwise have gone, and the dentist has thus been the means of assisting the physician in checking a disease that would otherwise have proved fatal.

We are becoming pretty well acquainted with the fact that intoxications of long-standing are favorably influenced by the administration of calcium in some form in which it is susceptible of being metabolized. Again, there are the calcium deficiency diseases *per se;* tuberculosis probably coming in this category. In the face of the foregoing facts, it would be logical to assume that, in tuberculosis, with a disproportioned calcium metabolism, there might be a concomitant metabolic calcium disturbance at work in this process of resorption which is going on or has gone on prior to the time the patient comes under our observation.

Calcium is the most important, and incidently the most neglected, of all the elements that go to make up our bodies. The reason for the neglect is explained on the basis of insolubility and lack of absorption of a great many of the salts. Let me remind you that, in all new inflammations, there is an excess of sodium and potassium and calcium deficiency. As healing goes on, there is a return of the normal ratio of these inorganic elements. Dr. Salveson shows, by animal experimentation, that calcium deficiency goes hand in hand with the disturbance of the parathyroid glands, and thus, these glands may become toxic, thereby increasing calcium metabolism. Therefore, it is only rational to presume that, when we are consulted and find this calcium deficiency in the alveolar process, we are dealing with a multiple condition, and should refer that patient to some good diagnostician for a thorough physical examination, with a special reference to tuberculosis. Then, as the periodontist can detect diabetes, so can the general practitioner, with properly made roentgenograms detect tuberculosis, together with many other diseases, be-

cause the film certainly shows us whether we have an abundance or a lack of calcium. The cause for the excessive shrinkage of ridges under saddles, in most cases, is not due to faulty technic in the construction of the restoration but to some systemic involvement.

In the past, too much time has not been given to the teeth and the restoration, and too little time and space have been given to the study of the osseous framework that is to support the teeth which, in turn, support the restoration. And, all this time, the roentgenogram has shown that the bone in some of our patients' jaws was nothing more than quicksand.

SUMMARY

These suggestions should be kept in mind: A broader use of the roentgen ray; better roentgenography; complete denture roentgenograms, studied carefully; better dentistry thought, talked, studied and, above all, practiced; cooperation with your patient's physician, who in return will cooperate with you; teaching the physician the difference between good dentistry and poor dentistry.

DISCUSSION

Frederick F. Molt, Chicago, Ill.: Dr. Browning's paper, leaves nothing to be added and little to be accentuated. My opinions with regard to roentgenographic technic and findings coincide with his. The advisability of using complete rather than partial oral roentgenograms; of this roentgenogram being really complete in that it leaves nothing to be guessed at and of such texture as to be interpretable, would seem to be so apparent as to need no stressing. The plea that the patient "cannot afford" a roentgenographic examination, is rather illogical; for, if he cannot afford it, he can ill-afford to invest in unsubstantial or short-lived reconstruction work.

The matter simmers down to one of individual conscience, and just as soon as every dentist is honest with himself and with the patient, our profession will begin to fulfil its mission. Altogether too many restorations are knowingly built upon the most precarious foundations.

This situation is due, in all probability, to more than one fact. Primarily, we have the instruction of the dental student, in which the mechanical seems to supercede, in a great measure, the medical aspect of dentistry. We may have, secondly, the purely personal desire on the part of a misguided operator to obtain a fee for a restoration even though it may be of rather doubtful prospective use. Thirdly, there is the deplorable inability on the part of many of our profession properly to interpret roentgenographic disclosures, or, coupled therewith, the willful disregard of these findings even when understood. Finally, there must be considered the disinclination of the average patient to sacrifice teeth, either because of timidity regarding extraction, or personal vanity which frequently dictates the retention of his own teeth regardless of the menace of disease; the folly of further investment in inadequate restorations, or the fact that the appearance of many a partial restoration cannot be as desirable as that of a complete denture, nor can the service obtained be so satisfactory.

As to determining the surgical problem involved: If extractions are indicated, the value of the roentgenogram is quite apparent. It is a proven fact that the areas in which residual infection remains are those that show marked atrophic change following extraction and that these undesirable changes may make a restoration utterly useless. The determination as well of the presence of root fragments or unerupted teeth may save later embarrassment on the part of the dentist and obviate reoperation with its alterations.

No one thing subjects the dentist to more criticism, if later pathologic disturbance develops, than his failure to have made a roentgenographic examination. An error in judgment is overlooked much more readily than the failure to employ this accepted diagnostic adjunct, and the necessarily incomplete diagnosis resulting.

Without question, the matter of a calcium content of bone is going to be more and more seriously considered. We may naturally assume that the same conditions will be disclosed in the bony structure of the mouth as are shown in the long bones. It is also quite logical to assume that systemic conditions may as readily affect these alveolar structures as the reverse.

Dr. Browning's paper gives us a great deal that may seriously be considered. Improvements in both technic and interpretation will naturally follow the more general and more intelligent use of the roentgenogram.

Benjamin Sandy, Minneapolis, Minn.: Dr. Browning's statement that roentgenography is even more useful in disclosing beginning changes that may aid us in prevention, than in revealing granulomas on teeth which are

already practically lost members is particularly apropos. How often in our experience is it necessary to reassure the patient when we suggest roentgenograms, that it is as much our purpose to disclose the details described, such as cavities not otherwise discoverable, overhanging fillings and pyorrhea pockets, as to discover periapical disease.

The admonition that films must show mesial and distal surfaces without overlapping is one that we might all remember as an essential.

I fail to see the advantage of extraoral films taken with the teeth in occlusion prior to starting restorations as advised by Dr. Browning, and wish that he would tell us more on this point.

Dr. Browning states further that, with properly made roentgenograms, the general practitioner can detect tuberculosis, by the variation of calcium content in the bone. I feel that this statement is without scientific basis. The mere fact that the limited number of tuberculous cases observed in this connection by Dr. Browning have shown a low calcium content is not sufficient to indicate that one is pathognomonic of the other.

We are all familiar with the rarefied appearance of the bone structure in cases of so-called rickets. We also know that these cases present a characteristic low resistance to infection. Tuberculosis is only one of the many infections that this lowered resistance invites.

The deduction that tuberculosis is, to quote: "the concomitant calcium disturbance," which accounts for the rarefied appearance of the bones should be arrived at only after mature study of a great number of cases by serial roentgenograms. If these roentgenographic records then show a progressive dimunition in the density of bone which, conversely, becomes more dense as the lesion is arrested, then and not until then, may we name one as diagnostic evidence of the other.

Dr. Browning's hospital connection gives him an excellent opportunity to carry on such research, and it will be of interest to the profession to hear his report on this phase covering a longer period and a greater number of cases.

Dr. Browning (closing): In regard to the point about tuberculosis that Dr. Sandy mentioned, I admit I have no scientific research to prove what I have said. Dr. Weston A. Price has given us considerable research data along that line, and I will have in the near future roentgenographic checkups to prove my point. The one thought in my mind in presenting this paper was to get you gentlemen to thinking and wondering. It has been a source for considerable thought on my part; and I believe that by thinking and studying we will find that the roentgenogram will tell us more, not only about tuberculosis, but as Dr. Sandy has brought out, other systemic ailments as well.

In regard to the extraoral films, we find that, by comparing and studying them in conjunction with the interdental films, the condensing osteitis due to traumatic occlusion is brought out more clearly; and very often the extraoral films taken with the teeth in occlusion show these conditions in much better detail than do the interdental films.

BONE—IN RELATION TO THE TREATMENT OF PULPLESS TEETH

By J. P. BUCKLEY, Ph.G., D.D.S., F.A.C.D., Los Angeles, California

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OUR profession today has assumed, intentionally or otherwise, a broader significance than that of any other period in its past history. This broadening of our field has brought many baffling problems; and among them, I have chosen to discuss the subject of bone: its embryology, histology, pathology and regeneration in relation to the general subject in which I, with others, have been deeply interested for many years—viz., the treatment of the pulpless tooth. In the preparation of this paper I have consulted freely the current medical and dental literature and standard text books on the subject as mentioned in the accompanying bibliography.

One of the essential factors upon which all rational therapeutics is based is that of diagnosis, which in turn implies a broad and detailed knowledge of pathology. For a proper understanding of pathology, one must know the anatomy and histology of the normal structures involved in the pathologic process. In other words, to know a tissue or organ in disease, one must first know it in health. Therefore, our first duty in undertaking the treatment of a pulpless tooth is to have an accurate knowledge of the structures in the periapical region of the teeth.

NORMAL BONE

Bone may be defined as a type of connective tissue impregnated with calcareous salts, chiefly calcium phosphate, and is classified as compact and cancellous according to the amount of interspaces which it contains. Generally speaking, the periphery is compact and the deeper portion cancellous.

Bone tissue makes its appearance relatively late in fetal life. The long bones are first outlined by masses of hyaline cartilage. With the exception of the flat bones of the face and those of the vault of the skull, the entire skeleton is primarily formed by plates of fetal cartilage. The process by which these cartilaginous plates are transformed into bone is known as intracartilaginous or enchondral ossification. Jordan and Ferguson[1] emphasize the fact that the process is essentially one of replacement of cartilage by bone, not one of change of cartilage into bone. Among the flat bones of the face and skull not formed by intracartilaginous ossification, we find the maxilla and a portion of the mandible. These bones, among others, are formed directly from the mesenchymal blastema without the intervention of cartilage. This method of bone formation which differs somewhat from the foregoing, is known as intramembranous ossification. It is a simple and more direct method of bone formation, and in principle, it is identical with perichondrial ossification. Endochondral bone differs from it only in respect to the additional processes involved in the removal and replacement of the hyaline cartilage.

The first indication of ossification of membrane bones is the enlargement and rounding up of a group or groups of mesenchyme cells, and their association

1. Jordan-Ferguson. A Text-Book of Histology.

in the form of an irregular membrane. Among the cells appear bundles of delicate collagenous fibrils, the osteogenic fibers of Sharpey, radiating beyond the limits of the cell group. The cells of this initial ossific group begin to function as osteoblasts and deposit an osseous matrix among the fiber bundles. This original osseous trabecula marks approximately the center of the future bone. The surrounding loose mesenchyma is, in the meantime, becoming increasingly vascular. Vaguely outlining the peripheral limits of the forming bone appears a relatively thick layer of denser, more cellular mesenchyma, the cells generally remaining fusiform. This represents the primitive periosteum of the forming bone. Numerous trabeculae appear and finally unite into a bony, spongy-like structure, enclosing vascular mesenchyma, the primary marrow. Numerous bone cells, original osteoblasts are contained in the spicules of the cancellous bone. The marrow includes osteoblasts and the special marrow cells, and also numerous osteoclasts under whose absorptive influence, assisted by the productive activity of the osteoblasts, the inner conformation of the growing bone continually alters its details for specific requirements. Peripheral osteoblasts, arising from the inner layer of the periosteum, produce the more compact external plates of the bone. Membrane bones, such as the maxilla and a portion of the mandible, do not have haversian systems (Jordan and Ferguson). The conditions that govern the formation of certain bones directly from the mesenchyma while others must pass through the cartilaginous stage are not well understood.

A microscopic study of the anatomy of bone shows that the framework is composed of lamellae or strands of connective tissue in a calcified ground substance, in which is lodged the marrow; while scattered through the substance of the lamellae are flat, oval spaces, the lacunae. These contain the branching bone-corpuscles, which send branches into the surrounding bone through the capillary channels, called canaliculi. In endochondral bone, larger tubelike structures, the haversian canals, channel the bone throughout and afford passage to the blood-vessels. These are most numerous in the compact bone. Each canal contains an artery and a vein, with protective covering of connective tissue which contains lymphatic vessels and endosteal cells (osteogenic). Canals, similar to the haversian, pierce the surface in a vertical direction and carry blood-vessels from the periosteum to the interior of the bone. These are called Volkmann's canals.

The developed periosteum is a tough, fibrovascular sheathing, intimately applied to the bone surface. Its outer fibrous layer carries the periosteal blood-vessels, while the inner layer is composed of cellular osteogenetic tissue, endowed with active bone-forming properties. The periosteum performs two important functions: by virtue of its blood and lymph supply, it carries nutrition to the underlying bone, and by its osteogenetic cells, it increases the thickness of the bone. The manner of attachment of the periosteum to the bone is of the greatest pathologic significance. The periosteum is continuous over the entire surface of all bones, except the portion of articulating surfaces covered by intervening cartilage. All such bones have a periosteum of their own; while bones that are united by sutures are covered by a common periosteum. While the periosteum covers the bone closely at all places, it is well to remember that it is not uniformly attached; it is only held in contact by the lightest of areolar tissues, except in the following positions: at the margin of the cartilage around the articulating ends of the bones; where it approaches the origin of muscles, insertion of tendons or ligaments and immediately beneath such attachments; and where the skin or mucous membrane seems attached to the underlying bone, as around

the auditory meatus, the gums and the mucous membrane of the nose. In all such positions, the periosteum is firmly attached to the bone. As stated by Noyes,[2] here it becomes a part of the bone, and through this medium the connections between muscles, fascia, etc., and the framework of the skeleton is accomplished.

The bone marrow is classified according to the character of its cellular elements into three grand divisions: red marrow, in which the blood-forming cells and their derivatives predominate; yellow marrow, formed by proliferation of the fatty elements with a corresponding deficiency of cellular constituents; and embryonic or myxomatous marrow, the result of proliferation of loose connective tissue.

It should be unnecessary with an audience of dentists to discuss in detail the anatomy and histology of the dental tissues proper. Bone and its associated structures have been thus considered somewhat in detail because our broader field in dentistry today includes these structures. However, in this connection, let us recall that the pericementum, which covers the cementum of the tooth and fills the space between the surface of the root and the bony wall of the alveolus, is a fibrous membrane, well-supplied with blood-vessels and nerves, and bearing a close relation to the periosteum in the attached portion; yet differing from it in certain essential respects. The pericementum is not a continuation of the periosteum down into the alveolus, the hole occupied by the tooth root. The latter stops at the border of the alveolus, where it unites with the pericementum around its circumference. At no surface on the cementum is the pericementum but lightly attached, as is the case of the periosteum on many surfaces of the bone. In the pathology and therapeutics of a pulpless tooth, this is an important consideration. The sievelike plates of compact bone forming the alveolus and to which the pericementum is also attached by the principal fibers, as named by Black, are called the cribriform plates, or lamina dura; and, according to Noyes, they are really made up of a thin layer of subperidental bone, which has been built on to the plates of cancellous bone. This author emphasizes well the fact that whenever the pericementum is separated from its attachment to the cementum, as in a pyorrheal pocket, it can be reattached only by placing and keeping the tissues in physiologic contact long enough for a new lamella of cementum to be deposited, into which the principal fibers extend, and become calcified.

With this groundwork, we will now consider the pathology of the tissues and the therapeutics indicated following the death and decomposition of the dental pulp and the involvement of the periapical structures.

GENERAL CONSIDERATIONS

Until the past twenty years, the treatment of pulpless teeth with gangrenous pulps and their sequelae was purely empiric. The reason for this was found in the apparent lack of interest in the pathologic process associated with the dead pulp and its chemical decomposition. A knowledge of the changes wrought in the splitting up of the complex bodies of the dental pulp by bacteria is of the greatest significance, pathologically and therapeutically considered. The only method by which drugs and remedies may be scientifically and rationally applied to the treatment of the conditions under consideration is to have a definite knowledge of the intermediate and end-products resulting from the putrefactive process. This has been elsewhere discussed by myself and others, and need not be repeated here; but its importance must ever be remembered; and we should always keep definitely in mind the now recognized fact that the toxins resulting from pulp decomposition, as well as

2. Noyes, F. B.: Textbook of Dental Histology and Embryology, Ed. 3, London, Henry Kimpton, 1921.

the active pathogenic bacteria that inaugurate and carry on the process, if, by instrumentation or otherwise, they are carried into the surrounding tissues, are capable of producing inflammation or suppuration (Scheurlen and Grawitz). This, then, results in a focus of infection.

A focus of infection is any circumscribed area of tissue that contains pathogenic bacteria. Infectious foci may be (a) primary—when they are usually found in tissues communicating with mucous membranes or cutaneous surfaces, or with a gangrenous canal of a pulpless tooth; or (b) secondary—in adiacent or distant structures as the result of direct extension or of hematogenous or lymphogenous dissemination (Albee).[3] Nearly all authorities agree that the teeth and jaws stand first as reg rds frequency of location of primary foci, the tons'ils, perhaps, coming second.

Several years before we knew anything definite about the systemic results of focal infection, and when rheumatism, for example, was still thought to be of gouty origin, I stated:[4]

> There is perhaps no field in dentistry which needs to be investigated more thoroughly at the present time than that of oral pathology. Today there is a great demand on the part of the profession for advanced therapeutics; and one of the essential factors upon which therapeutics is based is a broad knowledge of general pathology and a special knowledge of oral pathology. We have men who are laboring diligently in this special field; and as a result much light is being thrown upon the knotty problems associated therewith. Still, the average dentist is greatly in need of further light along pathologic lines. Take, for instance, the phase of pathology dealing with *infection;* and how few, when an abscess develops, search for the real cause! Far too many dentists treat the case blindly, applying drugs without knowing their specific action, and with little knowledge of the real pathologic condition they are endeavoring to correct.
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> To understand the mode or modes of infection one must at least have a working knowledge of bacteriology. It is generally supposed that when an infection occurs in a certain part of the body, bacteria have entered through an abrasion or wound. This is not necessarily so. There is scarcely a dentist who has used pressure anesthesia in his practice to any extent but who can recall cases where infection followed its employment for the removal of the pulp and the filling of the canal, although every precaution was taken to prevent this result in performing the operation. When an infection follows, the general opinion prevailing among dental practitioners is that bacteria were introduced in the removal of the pulp or in filling the root. While this is far too often the case, owing to carelessness on the part of dentists, yet pathology teaches that it is not necessarily true. For example, in the case of infection of the pericemental membrane following pressure anesthesia, the cocain hydrochlorid, a protoplasmic poison, may have lowered the resistance of the cells, and the bacteria present in the tissue, through the medium of the blood or lymph, take an undue advantage of the crippled cells and infection follows.
>
> Accepting the theory of pathologists that infection is due to the presence of bacteria, we find that an abscess may be caused in one of two ways: either by introducing the germs through a wound or by those already present in the tissue.

At that time, 1908, it was a debatable question among pathologists as to whether bacteria were normally present in the tissues of the body. It was a theory that all did not accept. Today, this problem seems definitely settled; for no one, I believe, longer doubts or questions the presence of bacteria or their hematogenous or lymphogenous transportation from one part of the body to another.

PATHOLOGY

An infection of the periapical tissues generally involves the bony structures. The extent of the involvement depends on several factors: the character and virulency of the invading organisms, and the amount and character of toxins escaping from the gangrenous canal—the source of the infection; as well as the immunity or lack of immunity of the individual. Nearly all investigators, Rosenow, Gilmer, Moorehead, Hartzell, Price and others, have found

3. Albee, Fred H.: Orthopedic and Reconstructional Surgery, Philadelphia, W. B. Saunders Co., 1918.

4. Buckley, J. P.: Importance of a Knowledge of Oral Pathology, Dental Digest, August, 1908.

different organisms involved in these infections; but all are practically agreed that the streptococci, of which there are many types and strains, predominate. The pathologic process, which is started in the tissue at and immediately surrounding the foramina, spreads to the cancellated structure of the jaw through one or more of the numerous openings in the cribriform plate or lamina dura. This soon results in an osteomyelitis, a destructive process that ultimately affects the medullary portion, the cortex and the periosteum. The lamina dura soon breaks down. The destruction of bone in an infectious inflammation is now held to be due to a combined action of osteoclasts and leukocytes. On this point, Endelman[5] says:

> The medullary or myelitic substance in the cancellated spaces becomes the seat of the inflammation. Through osteoclastic and leukocytic action, the hard substance of the bone, viz., the walls of the cancellated spaces, disappear; they are, so to speak, eaten through, and the haversian canals are made wider. The content of the spaces, the myelitic substance, becomes the seat of an acute inflammation in which the cellular elements, typical of this form of inflammation, are present. In time, the inflamed medullary substance, as the result of the action of the liquefying bacterial toxins, breaks down. In some places, the cortical layer of the alveoli is less than one-third millimeter in thickness. Its involvement and disappearance in the direction of thickness is therefore quickly brought about, thus opening an abundance of pathways for the absorption of bacteria and bacterial toxins. Acute or chronic periapical infections cannot therefore be regarded from the view point of strictly localized infections. If all of the acute or chronic infections of the periapical tissues do not give rise to systemic manifestations, it is not because the products of such infections are not in all cases at the portals of absorption, but because the individual is able to combat successfully the bacterial invasion. It is purely a question of individual resistance or immunity to infection.

BONE REGENERATION

Authorities are not wholly in agreement as to the exact process of bone repair or regeneration. Albee is of the opinion that the endosteum proliferates from the inner wall of the cortex and from the surfaces of the trabeculae to form a deposit of new bone; and, according to his belief, dense cortical bone has no power of direct repair, its regeneration depending on the integrity of the periosteum externally, the osteogenetic cells of the haversian systems and the endosteum internally. If the endosteum is intact, the inner layer of the cortex may remain viable. Even when it has been elevated by pus, the periosteum resumes its adherence to the cortex if the pus is removed, and renews the vitality of the underlying cortex, even though the latter may have appeared necrotic. After the purulent inflammation has subsided and the pus has been evacuated, the periosteum proliferates to preserve the vitality of the external layer of the cortex and to produce new bone. If the periosteum adheres to the cortex after pus has been evacuated, the cortex retains its vitality; but if the periosteum remains elevated or stripped from the cortex, it does not. Here, the proliferation of the periosteum occurs in a manner analagous to the process of external callus formation in fracture. Next to the cortex, polygonal bone-forming cells exist in the periosteum, some of which become included in the trabeculae as bone corpuscles, others remaining on the outer surface of the trabeculae as osteoblasts. Further osteogenesis of the periosteum occurs peripherally; the deep layer of the membrane forming bone, the intermediate layer producing the polygonal osteoblastic periosteal cells and the peripheral layer consisting of spindle cells as in normal periosteum.

New bone is softer than normal bone, and for this reason, in bone regeneration, Nature builds the new bone larger where it is necessary to sustain weight or resist pressure. As its density increases, the size gradually diminishes to approximately the normal. The osteo-

5. Endelman, Julio, and Wagner, A. F.: General and Dental Pathology, London, Henry Kimpton, 1921.

genic process, the work of osteoblasts and osteoclasts, as a whole is dependent on the blood with all of its hemal elements.

It is generally believed that periosteum is essential for bone regeneration after osteotomy. But Macewen, who has made a comprehensive experimental study of osteogenesis in regenerating bone in dogs, was led to believe that the periosteum functions simply as a confining, nutritive and protective membrane, but has no osteogenic significance. His observations led him to conclude also that, in long bones, the osteoblasts are derived from proliferating cartilage nuclei freed from the disappearing matrix. Under more favorable conditions, regeneration is believed to occur through direct osteoblastic activity; under less favorable conditions, a cartilaginous transition stage intervenes. Macewen deduces from his experiments that "diaphyseal bone is reproduced by proliferation of osteoblasts derived from preexisting osseous tissue, and its regeneration takes place independently of the periosteum." The periosteum is considered an important factor in determining the conformation and growth limit of bone.

One fact in relation to bone and its regeneration that has been wholly ignored or entirely overlooked in the past by those who have ruthlessly, and, may I say, thoughtlessly, condemned all pulpless teeth, has been repeatedy mentioned by Noyes and others: Bone, while physically hard and rigid, is a plastic tissue and is continually being built and rebuilt as long as it functions as an organ of support. We should never forget, in this connection, that bone is not a solid, unchanging tissue, but should rather think of it as a structure containing millions of active tissue-forming cells, each ever ready to respond to mechanical or other stimuli; thus continually building, tearing down and rebuilding its substance. Let us remember also here that Hatton and others have observed that resected roots of teeth have been subsequently covered with dense fibrous tissue, which apparently protects them from reinfection. Under favorable conditions, this tissue should be gradually replaced by bone.

THERAPEUTICS

In the past, three rather general methods of treatment for pulpless teeth have been more or less closely followed by the profession: the sodium-potassium-electronic method of Rhein; the sulphuric acid method of Callahan; and my formocresol-phenolsulphonic acid method.[6] The younger men have selected and used from these methods whatever seemed best for their purpose, improving the technic and adding new ideas to meet the demands for their individual work. Much credit, therefore, is due these younger men, for from them we have learned that no one method needs be followed in detail for successful results. The surgery of root-canal treatment has been developed today to such a high degree that little is needed along this line; but there is much room for improvement in the materials used for filling the canals after root and bone surgery. For this purpose, guttapercha has had a long and fairly satisfactory record. The only objection to its use is its inherent tendency to shrink as used in the past. Guttapercha, as such, does not shrink. The shrinkage of the material in root-canal surgery has been caused by the necessary solvents used in the old methods. On this point, Price[7] concludes that the "ultimate volume of contraction of the root filling is approximately the amount of solvent used where a solvent is used with guttapercha as a root-filling material." Today, we are in great need of a material with which or a method whereby guttapercha may be used without or practi-

6. Buckley, J. P.: Modern Dental Materia Medica, Pharmacology and Therapeutics, Ed. 4, Philadelphia, P. Blakiston Son & Co., 1917.

7. Price: Dental Infections, Oral and Systemic.

cally without solvents, and thus eliminate the only objection to this long-used, dependable and reliable material for filling the canals of pulpless teeth.

SUMMARY

1. Bone, while physically hard and rigid, is not an unchanging tissue. It is a plastic tissue, containing millions of active tissue-forming cells, each ever ready to respond to mechanical or other stimuli, thus continually building, tearing down and rebuilding its substance. This process continues as long as the bone functions as an organ of support.

2. The periosteum and pericementum, while in close relationship, differ in many essential respects. The pericementum is firmly attached to the cementum, which is not true of the periosteum as regards all surfaces of the bone.

3. Infectious foci may be either primary or secondary with reference to location. The teeth and jaws stand first among the principal locations of primary foci.

4. An infection of the periapical tissues generally involves the bony structures; and of the different organisms present in these infections, the streptococci predominates.

5. In acute or chronic periapical infections, there is always present the products that may cause systemic involvement. Different individuals, or the same individual at different times, may successfully combat the effect of the absorption of these infectious products. Susceptibility or immunity plays an important rôle here.

6. The treatment of pulpless teeth with root-end or bone involvement should not be undertaken unless conditions in the periapical region are such as to favor bone regeneration after the sterilization and filling of the canal. Bone will regenerate after such treatment if the pericementum is intact. Too much reliance should not be placed on the roentgenogram alone for determining the condition of the pericementum.

7. In the therapeutics of pulpless teeth, it is the safest practice to adhere to the use of those remedies which experience has taught fully meet the demands.

8. As a material for filling the canals of pulpless teeth, guttapercha has served our purpose well. For best results, it should be used without or practically without solvents. Today, we need a method or process of using guttapercha whereby shrinkage may be avoided. The urgency of the demand and the genius of our profession will surely solve this phase of the pulpless tooth problem.

DISCUSSION

Edward H. Hatton, Chicago, Ill.: I do not intend to discuss the first part of Dr. Buckley's paper except to stress his contention that bone is essentially a plastic tissue and particularly responsive in form and structure to the demands of function, to the application of stress and strain, or to the irritation of inflammation. Inflammation does three things to bone. It either kills it, and we have dead bone, that is necrosis; or it causes absorption, and we have a region of rarefaction; or it stimulates bone formation, and we have bone hyperplasia and hypercementosis.

I should restate his fourth conclusion to read that periapical infection always, instead of generally, involves the bone of the alveolar process. It seems to me that very few histologists or pathologists and fewer clinicians have grasped the full significance of the arrangement of the lymph channels in the periapical region, as demonstrated by Noyes and Dewey in this country. One could predict with certainty on the basis of that distribution alone that infection must pass out through the center of the apical foramen within the perivascular lymphatics into the periapical space and thence into the canals of the bone. In other words, infection here, as frequently elsewhere in the body, is a lymphangitis, and follows the lymph passages. These pass out through the foramen in the center of the pulp canal, and not adjacent to the walls but accompanying the vessels, and thence into the bone or into collaterals that run out into the periodontal membrane, so that the infection spares for a time the apex, the cementum at the apex and the attached periodontal membrane.

In the hundreds of periapical infections in which I have made examination histologically and anatomically (you note, I hope, that I say periapical infections—I am trying to keep

out of difficulties), I have not found that the condition is in reality an abscess except when there is drainage either into a pulp canal or elsewhere through sinuses. In all of these infections in which there is no measurable, no noteworthy, drainage, there is no abscess and no pus. It is wrong, therefore, to say that the apices of such teeth are soaked in pus, because there is no pus there to soak them. On this account, I have used the phrase periapical infection to include all these conditions, those with pus and those without. In all of these instances, I have never seen any variation from this distribution of the infection along the perivascular spaces, nor do I know of anyone who has. This is both fortunate and disastrous; fortunate, because the apex of the tooth is not at once denuded of its periodontal membrane by the infection; and disastrous, because the bone is involved so early.

Dr. Gilmer and I, in recent articles, have tried to describe, in a very simple way, just what happens around the infected apex. By partly collapsing a hollow rubber ball with a cone-shaped solid, one can create a satisfactory model for demonstrating the anatomy of these chronic or low grade periapical infections. The interior of the partly collapsed ball represents a space made by splitting the periapical membrane into an external and internal portion, the former lying against the root of the tooth and the latter pressed against the receding alveolar process. It is in this space that the infectious infiltration is found with the associated bacteria, the latter usually close to the apical opening.

These capsules may be of thick, dense fibrous tissue, the bony walls made up of dense cortical bone, and the cementum of the root thickened, particularly at the level of the split in the periodontal membrane. Or the capsule may be thin or poorly developed throughout or locally. Such variations are usually associated with absorption of the apex or of the alveolar process. These are the types that produce large areas of rarefaction, as shown by the roentgenograms.

Absorption of the apex is significant of denudation of that portion of the cementum or its periodontal membrane. Any considerable separation of the apical periodontal membrane by such an infectious process is a signal of danger to the clinician. For he must know not only that periapical infection increases the hazard of treating and filling root canals, but also that the treating and filling of the root canals of teeth having apices denuded of their periodontal membrane is almost universally associated with failure. This statement corresponds with conclusions arrived at by Dr. Buckley, but it is so important that I have taken this long roundabout way to emphasize it.

It has seemed to me that dentists are prone to go to extremes in the evaluation of the focal infection theory. Without entering into any extended discussion of this, I cannot let the statement "that the teeth and jaws stand first among the principal locations of primary foci" pass unchallenged. In an illuminating tabulation of the sources of bacteria recovered from the blood by cultural methods,[8] in not one instance were the teeth and jaws involved. Since, of necessity, these infections are acute and of the pyemic or septicemic variety, the application of such evidence to our present discussion may be rightfully questioned. On the other hand, the frequent and vicious relationship of chronic and acute middle ear and mastoid disease to the distribution of bacteria by the blood stream, as shown by these figures, is worthy of study. Irons and Brown,[9] in a thorough study of iritis, discount the mouth factor and suggest that the primary focus is much more likely to be found elsewhere. They suggest the hila of the lungs and the lining of the large bowel as possible primary locations for foci.

Many dentists believe that the majority of the infections of the maxillary sinus are primary in or about the upper teeth. Indeed, there are those who assert that this is true in no less than 100 per cent of cases. Yet such careful observers as Cryer, Logan, Turner and Skillern believe that not more than 20 to 30 per cent are primary in the mouth. Hajek, one of the continental writers in this same field, sets the figure at 8 per cent.

I do not wish to question the seriousness of mouth infections; yet mouth infection is so common that it is hard to find individuals with infection elsewhere in the body that do not have some evidence of mouth infection. Now why should these, in every case or in the majority of the cases, be labeled primary and other foci secondary. Isn't it a possibility, and (I believe it is in many cases) that mouth infection is not primary but secondary to infection elsewhere in the body?

Let us, as dentists, for a time try to pin some of the responsibility on other groups. In nothing that I have said do I wish to minimize the hazard of mouth infection, or the hazard of treating and filling the pulp canals of teeth. But I am able to say, as Dr. Buckley has said, that bone, if relieved of the irritation of infection, will, when stimulated by the demand of function, replace structures that have been lost.

I think that the most productive field the dentist has is that of prevention, and that

8. Martin, W.: Significance of Bacteria in Blood Stream from a Surgical Standpoint, Ann. Surg., 74: 421 (Oct.) 1922.

9. Irons, E. E., and Brown, E. V. L.: Etiology of Iritis, J.A.M.A., 81: 1770-1776 (Nov. 24) 1923.

you, as operative dentists, will in the future practice more and more preventive dentistry rather than corrective dentistry. We have had a splendid example in the application of this principle today to operative dentistry in the presentation of the first paper of this afternoon's program,[10] in that a man has seen his responsibility, has risen to it and adopted or adapted operative procedures so that he prevents the making of pulpless teeth and the necessity of meeting this hazard that I have just described.

P. G. Puterbaugh, Chicago, Ill.: We are reminded by Dr. Buckley that bone is to be regarded as a plastic material; this has also been emphasized in Dr. Hatton's discussion; and is the thought that we should take home and carry into practical application in our interpretation of roentgenographic findings.

In my opinion, bone as a tissue has the poorest resistance to infection of any tissue in the human body. This is because of its large amount of calcified intercellular substance and its lack of adequate blood supply to meet the needs of combating infections. So, in order to combat infections, it finds it necessary to destroy or absorb much of the intercellular substance to increase resistance, and that is why we have areas of bone absorption showing in roentgenograms of periapical areas when irritants have been present over a long period of time.

Regenerated bone, after such absorption, may vary as to density. Many areas in jaws will indicate sites of previous infections that have been healed in by an osteosclerosis or a hardening beyond that which we would call normal. On the other hand, it is possible to have areas that will never completely regenerate up to the usual density; and that is a thing that we must learn to consider and to read into our roentgenographic interpretations.

It has been found that pressure anesthesia under aseptic conditions with cocain is followed, in quite a high percentage of cases, by periapical bone absorption. The calcium phosphate has been absorbed from the intercellular areas; but it does not always indicate that the entire area has been broken down. The fact that calcific material is gone, in many instances, indicates the presence of an active inflammatory process.

I would emphasize Dr. Hatton's statements as to the prophylaxis of the conditions that excite bone absorption. How shall we prevent them? First, if a pulp of a tooth is so involved in inflammation that the symptoms would point toward the ultimate death of that pulp, the proper procedure is to remove the pulp before the periapical tissues become involved in infection; but best of all is the prevention of destruction of the pulp by so educating our patients in prophylactic procedures that the pulps will not become involved in conditions that would demand their removal.

Dr. Buckley (closing): All the time and study and effort that I put into the preparation of this paper has been fully justified, since it was the means of bringing to us the knowledge contained in those two statements by Dr. Hatton, who is an M.D. and not a dentist; but an M.D. who has the dental viewpoint. I am not a histologist, pathologist or bacteriologist. I have confined my work to therapeutics. Dr. Hatton gave us a beautiful description of the methods of distribution of the infection along the artery and vein right through into the bone, and he emphasized two things that are in themselves an advantage and a disadvantage, an advantage in that the periapical tissues or the pericemental membrane, as we thought once, is not immediately and at once stripped from the cementum, and a disadvantage because of the fact that the bone itself is immediately and at once involved. This is very pertinent. And then the statement of Dr. Puterbaugh's emphasizing or bringing out the fact that bone of all the tissues of the body has the least resistance to infection. I believe he is right. I have never thought of it in that light, and he has given me the premises on which he has made that statement.

I am glad that Dr. Hatton saw fit to disagree with the statement that I made, which was not mine but that of Albee. From the work that has been done by both medical and dental men along the line of focal infection and its relation to systemic disturbances, it seemed that the teeth and jaws did stand first as Albee stated, and I accepted the statement, but I am glad that Dr. Hatton says that it isn't true.

In my book I refer to a rhinologist of Indianapolis who said years ago that 70 per cent of the infection of the maxillary sinus was due to the teeth, and here Dr. Hatton gives us an authority that gives as low as 8 per cent, and the average, as given by a man whose opinion I respect and whose patient I have been, is between 20 and 30 per cent.

10. Avary, Hugh: High Lights on Porcelain, J.A.D.A., to be published.

FULL DENTURE PROBLEMS

By CHARLES LANE, D.D.S., Detroit, Michigan

(Read before the American Dental Association, Dallas, Texas, November 10-14, 1924)

DISCUSSION of full denture construction at this time is one of our most difficult problems because, progressing as we are, so rapidly, in a scientific way, we may find that truth today may not be truth tomorrow, and that our rapid progress makes it next to impossible for anyone of us to keep in touch with everything that is being done—some good, of course, and some not so good. But we are finding more than ever that the fundamentals as considered by the investigators are practically the same, and often, after much argument, they find that they are so close together that the difference is negligible in the hands of most denture producers.

In the not distant past, the responsibility accepted by the producer did not amount to much, and the condition was deplorable. The recoil was a long time coming, and now that it is here, it seems hard to keep up; and the men who have not progressed really do not know much of anything about the possible problems. They are the most comfortable mentally, it must be admitted; and the most uncomfortable are those men who seem to know the most about the subject, both theoretically and practically.

It is quite natural that the public selects the diplomat in preference to the technician, and the reason is obviously due to the public lack of education in reference to dentistry. It is more or less sad when we as a profession make our collections for what we do rather than for what we know.

The public is suffering for that which we could give it as an organization, and the reward would be much more comfort for the men who are insisting on the production of the best in their mental and physical makeup, and for the public itself.

Those who are looking for the best in dentistry are the educated people; but regardless of the patient's knowledge in reference to medicine, law, manufacturing, merchandising, etc., he may know nothing of value in reference to dentistry, and there is no question that we are accountable.

It was proposed to one city organization that they as a group make a series of educational articles available to the public, but the proposal was not taken to kindly nor acted on. The proposers of the idea and scheme compiled some statistics, one of the items being the replies to an inquiry addressed to 100 dentists as to what percentage of dentistry could be called good dentistry. This was not a select but a miscellaneous group. The reply from the optimists was that 25 per cent was good, and the most pessimistic thought that only 3 per cent was good. These men being representative in the profession, we might ask ourselves some pointed questions.

It was remarked that the reason why the educational proposal was turned down was because 75 per cent of the profession could not afford to advise their clients in reference to what they had done for them in the past years, and it was not hard to believe that this might be the real cause.

There are several excellent reasons why, in an organized way, we should educate our public, one being the benefit

of the public themselves so that they would have an understanding of the service rendered, acquired in a way that best suits them. Today is the day of the written word, and not of the spoken word as it was fifty years ago. Another reason is that, with an educated public, our difficulties would be so much more appreciated and the intelligent demand for better service more common.

It seems to many that the people who come to us are, from a psychologic angle, not with us. They come because they simply have to and they are not in the frame of mind when they do come for us to do our best for them. Does not the restlessness and possible actual resistance react on an operator, and if it does not influence his work to some slight degree, it at least draws on his nervous system and so handicaps his efforts.

Literature written by the layman in the recent and the distant past is not of assistance to us as a profession, and we should make it our business correctly to inform the public. I read a skit by Walt Mason: "Distraught with pain that stabs and burns, I set out for the dentist's lair, and while my grit to water turns at the thought of his low swinging chair, I curse the day when I was born, revile the power who made me, etc." I read another skit the other day apparently written by a layman: "One of the most fascinating contributions to dental literature is yet to be made. It is a treatise on the psychology of dental fear. Without doubt highly interesting to the dentist, it would be equally interesting to his patients. That such a thing as dental fear exists cannot be denied. One meets it everywhere. It is no respecter of class, etc."

I wish to congratulate the Minneapolis District Dental Society for their broad-minded consideration of public education, and for their practical efforts, which have resulted in many definite instances of its immense value to the district, the state and the country.

In order to be successful denture producers, we must, in the first place, be excellent character students and mental diagnosticians. We must be familiar with the different types of mentalities of those who appear for service and the modifications of the type. Personally, I would rather depend for my income on my ability to classify mentalities than on my ability to classify physical form; or, in other words, I would rather make a case for a patient presenting a bad physical form and a good mentality than for one having a good physical form and a bad mentality. A prospective client may have an excellent mentality in the consideration of almost everything but dentures.

The next item of importance in denture work is the ability of the operator to classify physical form, the tissue attachments, the breadth of the ridges, the depth of the ridges, the tongue size and activity, the throat form, the post-dam area, the comparison of the hard and soft areas and the saliva, and be able to care for the different conditions as they are met. You may have a process covered with a thin layer of tissue or with a thick or a medium thick, or thick in some places and thin in others, etc., and each has to be taken into consideration and treated with knowledge for an efficient result.

You may have a lower broad arch, and upper narrow arch or vice versa. You may have a narrow post-dam area or a broad one. You may have heavy tuberosities or none at all. These conditions make such a difference that they must be noted and dealt with intelligently in order to produce successful dentures. There are many items of form and condition that might be considered for comparison. Suffice it to say that correct diagnosis of cases is the first and the most important step when considering a satisfactory result. If a surgeon makes a diagnosis, he may lose his patient's life. We may lose the patient as a client, and, if we do not lose him, we have an unsatisfactory result, which,

while the patient may not be conscious of the defects, is not a credit to this profession of ours; nor will the denture do its work as intended, in which instance the worst has happened.

It would no doubt surprise you to know that many of the cases that we consider successful are far from being what we imagine. Dentures that do not give a patient any trouble and are considered entirely successful by them may be far from efficient as a masticating equipment. It might be wise for you to test your next perfect case with some food; for instance, celery. Have your patients masticate a bolus of celery until they wish to swallow it, then make a test to see whether or not the tendrils of the food are being broken or cut and the food really masticated and not just mixed with saliva.

Many of us are content, and without reason. The old quotation "Where ignorance is bliss, it is folly to be wise" may be applied, and this is possibly what makes us live with a relatively clear conscience.

In the minds of a great percentage of the profession, the impression is the most important major detail in the construction of dentures; which is certainly a mistake. You might say that no detail is more important than another, but if we make a difference, a consensus of opinion by investigators would disclose the fact that mandibular relation comes first, arrangement of teeth, second, and impression making, third.

A great percentage of the profession have their minds set on the fact that one of a number of materials is the only one to use for impression making. I do believe that there is no one material nor particular method that will assure the best result in every case. The operator must vary his procedure and material to meet conditions, and probably would not use the same material in the case of a high vault, narrow ridge and high tissue attachments that he would in the case of a low vault, broad ridge and low tissue attachments. In practice, I would use a plaster wash to complete the impression in the first case and would use Kerr compound in the second.

It is noted that the really interested men all over the country, who consider the same fundamentals but vary in details, in 90 per cent of cases arrive at approximately the same result. The matters of overcompression of tissues, nonadaptability, etc., are due to lack of diagnosis of the individual case and not to a fundamental or a material. There is a place for all the known impression materials and methods, but no one of them, neither methods nor materials, is practical in all cases.

In registering the mandibular relation, there are many interesting ways of arriving at correct results, but no one way seems to have the greatest number of followers. The mere fact that any place on the correct arch, within reason, is right is proved to be entirely wrong unless the considerations are the position of the condyle heads and the parallelogram of forces. If the parallelogram of forces is correct, the condyle heads will be correctly positioned.

Some of the investigators think that the relation should be taken under stress; while others do not think so. I believe that the relation should not be secured under stress because the process is covered with a layer of soft tissue which, under stress, will be moved, compressed or placed while the model is hard; which would result in an incorrect relation of the models on the approximator. This is not, of course, considering a cheek bite.

In mounting models on the articulator, it seems reasonable that it should be done with the idea of placing them, at least, approximately correct. The more closely related they are to moving parts, at the same level and the same distance anteriorly or posteriorly, the better they should be. How we can make a transfer to the articulator without some degree of precision or understanding and expect

to have a balance result is beyond the belief of many men who are seriously concerned in serving their clients to the best of their ability. This is sufficient reason for the face bow or jig. There is the sense of security, developed in the use of the face bow, that is more than worthwhile and, to my mind, is absolutely necessary. All that would be necessary on the part of the profession for success is that they do nothing without a definite and valid reason. Your reasoning might be wrong; but, if so, you would find it out, probably in a short time; or, stated in other words, if you had a real reason for each action, you would know something about the game. I know men who play bridge, whist, golf, chess, etc., who know Whithead and Work from cover to cover, who study combination plays in the newspaper every day and who do not make a play without a reason; yet they will construct a denture without one logical routine step.

In selecting teeth for a case in practice, I conclude the mold form at first glance. If the face impresses me as being square, I use a square tooth; then, in a detailed examination, it may be found that the face has details making it more of a tapering type. The square tooth is then arranged in tapering formation, having characteristics pertaining to the tapering type. In my mind, it is not the tooth selected that makes the difference, but what is done with the tooth or combination of teeth. It is not difficult to make square teeth look tapering, nor tapering teeth look square. I believe that our studies in esthetics are sufficiently complicated to discourage the majority of us. You will find that the more work you do, the fewer molds and shades you will use. In reference to shades or hues of the manufactured teeth, I would say that there are too many.

In arranging the teeth, we should sacrifice the upper for the convenience of the lower as having the lesser stress-bearing area, and because the tongue and cheeks interfere with it. Therefore, the operator should not, except when it is absolutely necessary, aggravate these conditions. It has been found that if the teeth of the lower jaw follow the direction of the teeth just removed, there will be less trouble, provided they do not vary too much from a convenient arrangement; that their long axis runs through a common center, and they are over the ridge. If you inspect the mandible of a skull with the lowers in position, you will find the posterior molar buccal cusps over the center of the ridge. In the case of a denture, every stress brought to bear on the case has a tendency to carry it to its seat on the ridge, rather than to tip it off and out of place.

The only reason why so many of us get by at present is that Nature is a wonderful compensator and our patients are not good judges, except in the detail of sore mouths. Very often they have nothing with which to compare their dentures, and are not competent judges in any case. Cases in my practice that I know were not right were at the time thought very well of by the patient.

There is no doubt that classification leads to better results, and so should be studied intensively. The possibility has been made comparatively easy by the intelligent efforts of Dr. M. M. House. He has completed a comprehensive and definite classification of mentalities; physical form, tissue depths, tissue attachment, tongue size and throat form, etc. Familiarity with these classifications and a little practical experience will put one in touch with many conditions that probably would have been missed altogether. Often, I have cases referred to me that though considered particularly difficult were not so bad, and other cases that these men have completed were failures because an intelligent or systematized classification was not made.

After a correct relation has been established, one cannot be too careful about the waxing up, flasking, packing and vulcanizing. I believe as many

cases go wrong during these procedures as in any other way. No case comes out of the vulcanizer with the same relations as when it went in, so very definite care should be taken in order to minimize the changes. It is a common occurrence to see, in a laboratory, a half dozen cases packed, warmed, stacked and placed in a heavy swedger and the flasks brought together. When I see such things, I am not inclined to criticize the commercial laboratory too severely, because, for the money the profession is willing to pay them, they must hurry. The word speed is mythically hung up in every corner. Efficiency, of course, is in their minds, but they must live.

In view of the fact that waxes change and changes take place during setting up and vulcanizing, it is reasonable that your case should be "ground in" and should finally work just like valves in an automobile. The only reason why they do not continue to do so is because the bases upon which the cases are working change so frequently that adjustment, articulator grinding, or spot grinding, is necessary. Cases need regular care and adjustment in order to keep them effective and save the mouth from traumatic injuries, which are much more prevalent than most of us have any idea. Traumatic injury is one of the banes of our existence, and it occurs most often in cases of partial dentures. It is instanced very often in cases of full uppers and partial lowers—let us say, when the lower anterior six are retained. How many upper jaws have you seen almost ruined as a good base for a denture, owing to the fact that the partial lower was not rebased and kept up to occlusal contact, and as a result, the anterior six lowers constantly tap on the anterior part of the upper? The result is a definite absorption of the process in that region of the upper.

The education of your patients should start at the first appointment and continue during each appointment, until you are not to see the patient again. In other words, they must be sold each time they come to you. The term "sold" in my mind is keeping them in a good mental condition. This is accomplished by bringing clients back to earth, if their anticipations are beyond my ability, and bringing them up to par if they are too low; recognizing the fact that you have them where you want them, and then exercising your mental equipment to keep them there. You can make patients very cheerful, indeed, without having them imagine that they are going to get more than you can deliver. There is no question that they must be handled differently from any other class of dental patients.

When a denture is delivered to a client, he should be advised to learn first to wear them, before attempting to masticate. The first day or two, there is a definite settlement. Then they should be ground in again, and a difference will be immediately apparent. There comes a smile of confidence, and you usually find that a more cooperative spirit has developed, and the difference the "grind in" has made clinches the matter for you. You advise them not to attempt to masticate before they can wear the denture, but the first thing they do is try and, of course, they fail. If you can educate them to approach the art of masticating with dentures slowly and with reason, you have done a great work. They use them, you know, three times a day, and they take 3,000 bites during a five-course meal, so you see a great part of their life's comfort and pleasure is dependent on you.

If more of us had mental and physical balance sufficient for intense investigation, we would give to the world what it very much needs: really serviceable dentures. We are all deeply indebted to those men who have given so unselfishly of their time and money in advancing the science of denture construction.

COORDINATION OF THE VARIOUS FACTORS ENTERING INTO PARTIAL DENTURE CONSTRUCTION

By WALTER F. CHAPPELLE, D.D.S., Buffalo, New York

(Read before the American Dental Association, Dallas, Texas, November 10-14, 1924)

IT is customary among a large proportion of dentists and patients to look on partial dentures secured by clasps as uncomfortable, dangerous expedients preceding the time for full dentures, the need for which they greatly hasten. Most of the objections to this type of work can be eliminated by more thoughtful planning and skilful execution. It is the purpose of this paper to emphasize certain precautions in planning the various parts and executing them, so that only necessary units, neatly made, will be coordinated into a comfortable, efficient, artistic assembly, which will do as little damage to natural teeth as possible and be as nearly permanent as conditions will permit. Some damage to remaining teeth is apt to result with time in spite of great care, just as in any other type of restoration, owing to the added work they are expected to do. Maintaining permanent occlusion is sometimes impossible with unfavorable ridge conditions and the somewhat irritating rubber saddles. The same care as used in fixed bridgework or in removable bridgework of the Chayes type to keep from settling along inclined surfaces on abutments will give results in partial dentures, and have an added advantage when abutment teeth are perfect and free from fillings. Cleaning the inside of clasps, and systematic prophylaxis and massage of gingival margins are essential.

Certain factors are more persistently neglected than others. They are: (1) models; (2) selection of clasp patterns and materials for the definite part they are to play; (3) poor execution, leaving unopposed clasp forces (especially that of allowing clasps to slide on surfaces not parallel to the line of settling under stress), and (4) balanced occlusion and individual tooth anatomy. We have stressed balanced coordinated occlusion and lost sight of the advantage of point and line contact with liberal escapes, over broad surface contact with no escapes to balance carrying ability of teeth or ridges.

Although my method of selecting abutments and location of direct or indirect supports is that of Dr. Cummers, I differ in that I depend almost entirely on the various types of wrought wire clasps and some combined wrought wire and cast combinations, described later, and do not use any wrought plate clasps, and very rarely a cast clasp.

Because so many partial dentures require carrying of part of the stress on the abutments and part on the soft tissues (for instance, one side only of a bilateral case carried on abutments), I shall include abutment support under partial denture construction.

To facilitate planning, I shall briefly describe the various parts so as to emphasize the purpose for which they should be selected. We are apt to forget that their form, size and location may be varied to gain definite results and that

their proper functioning is often interdependent. The parts used are: (1) clasps, (2) supports or rests, (3) indirect rests, (4) stress breakers, (5) saddle form and area and (6) occluding surface.

A clasp is a ring or a band of material partly encircling a tooth to grasp two or more of its opposing surfaces. There are three methods of constructing, their names self-explanatory: (*a*) cast, (*b*) wrought plate and (*c*) wrought wire.

In my opinion, cast clasps are usually too rigid in their grasp of the tooth, cover too much tooth surface and are too bulky; and if cut down in bulk, they are not durable. My criticism of cast clasps applies to that type as usually made with poor casting technic, porous, stiff and bulky. They usually maintain very close contact with the tooth over their entire surface, while bent wire clasps are less accurate and bear only at portions of their length and thus are less apt to cause decay.

Wrought plate, like cast clasps, unless relieved are too rigid in their grasp of the tooth and cover too much surface. Both of the foregoing are especially indicated for embrasure clasps on anteriors and first lower bicuspids, where a rigid grasp of slanting surfaces is desired.

The advantages of wrought wire clasps are:

1. They do not require the covering or mutilation of large tooth areas.
2. Chemicobacterial action is less likely because elasticity and tensil strength of drawn wire allows less bulk than castings or plate material and, if decay results, a smaller inlay repairs the damage.
3. When properly planned and executed, they bear on the tooth only at portions of their length necessary to gain the desired hold.
4. Their flexibility transmits less of the torque of mastication to the abutments.
5. For the same reason, they are more readily removed and replaced.
6. In accordance as they grip a greater or less number of surfaces, their grasp of the tooth may be made rigid or flexible as desired.
7. If used with a cast rest, they will stand as much stress of mastication as necessary.

Disadvantages most of which may be overcome by careful planning and execution are the following:

1. On anterior teeth, it is often necessary to show clasps or alter anatomy with inlays.
2. If necessary to go close to the gum line for a grasp of unfavorably shaped teeth, careful watching or inlays are needed for protection.
3. They require greater skill in planning and making to get just the type of grip needed for each particular case.
4. If improperly made they leave unopposed forces.
5. They make a sharp break in the lingual and buccal anatomy of clasped teeth.

The foregoing is in contradistinction to cast or plate clasps as usually made and used, which cover surfaces above and below the bulge. By unopposed forces is meant stress, which will cause movement of the clasped teeth laterally or their elongation; for example, lateral tilting of teeth or riding down an inclined clasped tooth surface or crowding under a bulge.

Since wrought wire clasps varied in design are suited to varying purposes in gripping a tooth, we will next outline some types and their uses:

1. A clasp extending around the tooth just far enough so that it cannot be drawn off horizontally without bending of clasp ends, resting at the bulge on nearly straight sides and gripping at two opposite points.
2. A similar clasp but gripping its entire length, except across the approximal, all bearing surface at and slightly below the bulge.
3. A similar clasp but crossing the crest of the bulge of the tooth and grip-

ping surfaces slanting both ways from the bulge.

The foregoing types may be of round or half round wire, usually the latter. Nos. 1 and 2 may be mesiodistal in their grip. Type No. 1 rarely is used with a rest. Type No. 2 is used both with and without a rest. Type No. 3 always requires a rest. The greater the opposing surfaces grasped, the more rigid the hold on the tooth. At times, Type No. 3 has the extremities of the clasp carried up over the border of the occlusal surfaces to prevent mesial tilting of the second and third molars.

4. A clasp extending around the tooth at the bulge, touching briefly at opposite sides and having one or both ends of the clasp carried up the embrasure and over the border of the tooth forming occlusal rests.

5. A similar clasp, but having one end of the clasp carried up the embrasure and over the border of the next tooth, forming an indirect support.

6. On anterior teeth all or part of a clasp of bent wire combined with castings on lingual surfaces. This gives tough tensil extremities when desired, combined with the rigid close bearing of a casting.

7. A half Jackson crib.

8. A complete Jackson crib.

The fourth and fifth types and the cribs are of round wire, and the fourth and fifth never have rigid occlusal rests.

Embrasure clasps should be rigid in construction, grasping the tooth firmly, and should carry stress rigidly or be protected by stress breakers.

Indirect rests are projections resting on surfaces for the purpose of counteracting displacing tendencies at some opposite extreme of the restoration and depend on the fulcrum action of clasps. They often do damage by settling on inclined planes.

Stress breakers are devices for breaking the transmission of undesirable stress to abutments.

Occluding surface may be considered separately as coordinated balanced occlusion and as individual tooth anatomy.

Saddle form and area has two purposes, filling in bulk and actual support.

By coordination of these various factors is meant as perfect a balance between the parts used as possible so that esthetics, comfort, stability and efficiency will be developed with no unnecessary parts or damage to the remaining teeth or soft tissues.

1. Good models should be mounted with undercuts reproduced.

2. The teeth should be examined by roentgen ray and occlusion and habits of mastication should be studied, angle of cusps, rate of wear, arch relation and ridge form and texture being noted.

3. Occlusion should be corrected, if necessary and the mouth should be put in good condition. It is not always sufficient to articulate supplies to the remaining natural teeth, which may not coordinate with normal mandibular movements.

As some of the reasons for such observations, the following suggestions are offered:

A hard biting stress if carried on the natural teeth means heavy occlusal rests on as many abutments as practical and limitation of the number of the teeth carried in a span.

A hard bite, if carried on soft tissue, means large saddles, and if carried on either teeth or soft tissues, requires consideration of individual tooth anatomy in the treatment, to minimize the possible damage to supporting parts by allowing escape of food.

Therefore, the degree of wear on cusps and heavy muscle development should be carefully estimated.

The tendency to chew in certain parts of the bite plane should be noted, whether chop or triturating bite, etc.

Shape and texture of ridges and vault, and muscle attachment should be noted,

as should extreme movements of the lips, for use in developing esthetics.

Range of lateral movement of the mandible and any other peculiarities bearing on the work to be done should be noted.

We are now ready to plan.

In general, I like Dr. Cummer's method for selecting abutments, because of its simplicity and the lessened number of parts used. Simply stated his rule is: Choose the strongest teeth for abutments diagonally or diametrically opposed, if the case involves both sides or one side and the anterior ridges. Use the straight line or triangle for choosing the location of indirect support.

In his rules for choosing abutments, when choice is possible I would emphasize choosing a tooth whose long axis is as nearly perpendicular as possible or parallel to the line of settling under stress.

Before planning the clasps, it should be determined whether it is desirable to carry biting stress entirely on the abutments, entirely on the soft tissues, or partly on both.

Small one tooth spaces, longer than two tooth spaces, sharp ridges or very soft ridges are unfavorable for saddle support unless occlusion is very carefully developed, especially development of line and point occlusal contact.

In my hands, saddles supported at one end on a rigid occlusal rest and at the other end on the ridge, unless the abutment is very favorable and the far end of the ridge very broad and firm, are unsatisfactory.

A Type 1 clasp is indicated for carrying stress entirely on the soft tissues and must be used with another of similar type on the opposite side of the arch, without occlusal rests but always with indirect rests. It is ideal for upper and lower posterior bilateral saddles. It must always grasp parallel surfaces, which are parallel to the line of settling under stress and must never be used where it can slip under the bulge on a tooth. It should never be adjusted very tight and should be of light wire, No. 14 to 16 half round or No. 18 round. This makes an ideal flexible grasp, transmitting little stress to the abutment. The ridge must be firm and well formed.

Type 2 generally requires an occlusal rest to prevent its slipping under the bulge and causing elongation of the tooth or jamming of the saddle into the ridge, unless the sides gripped are parallel to the line of settling for some distance downward. It is suitable combined with an occlusal rest for carrying stress on an abutment, especially when one end of a saddle is carried on the tooth and the other end on the ridge, or for use on a bicuspid when one or two supplies of unilateral type are carried on abutments; or a bicuspid abutment of bilaterals is carried on abutments. If this type is used without a rest, it has the same use as Type 1. It is a little more rigid than the first type, but because of a closer grip of a greater circumference, it is not indicated on teeth whose sides are not parallel to the line of settling under stress, when an occlusal rest and stress breaker are not desirable in the plan selected.

Type 3, which has a very rigid grasp of the tooth, requires a rest and is ideal for molars or teeth whose long axis is not parallel to the line of settling under stress. It tends to prevent further tipping of such teeth, which would occur if a rest were used without securely holding the tooth against further changes in its tilted long axis. This type is also ideal for unilateral first and second tooth bridges, especially to be used on molar abutments and large bicuspids.

Type 4 is ideal for gaining partial support on the occlusal surface of a tooth, where a rigid rest is not desirable, nor a rigid grasp of the tooth; but in cases in which a slight settling would cause the clasp to slip under a dangerous bulge or in which a slight amount of compensation for a thin mucous tissue compression is desirable, with some

stress on the abutments, such a clasp must be used only on the bilateral cases.

Type 5 is ideal for combining a rather flexible grip of the tooth with a light rest and for preventing heel raising in short bilateral posterior upper and lower saddles supplying molars, without the use of a long indirect rest arm.

Jackson cribs and half cribs are ideal for grasping abutments having no approximal spaces.

Stress breakers of the various forms on the market are indicated only where settling under stress would cause increasing clasp pressure on surfaces not parallel with the line of settling or only where it is not desirable to carry stress on the teeth. Excessive mobility is not desirable. Very rarely is it necessary, when properly planned, to have more than vertical compensation.

Coordinated cusps and balanced bites are always indicated.

A long balanced bite without a short balanced bite acting simultaneously is dangerous when the case involves only the posteriors, because, in protrusion, bearing will be only on the last molar, causing pressure in that region and a tendency for the anterior portion of the saddle to rise and put a strain on the abutment clasped. Rather than use an extreme curve of Spee for balancing the bite, if posteriors only are being restored, I would rather leave a deficiency in the long balanced bite. (By this, I mean that a long natural overbite, and with it a high curve of Spee for balanced bite purposes in protrusion, would result in only the natural anteriors and the last molar on the partial denture touching opposing teeth, rather than allowing cusp height to balance the teeth simultaneously as in a short balanced bite.) Sometimes, it is possible to open the bite sufficiently to decrease the overbite and gain a balanced bite without a high curve of Spee.

In cases involving anteriors and posteriors, when it is possible to use a shorter overbite or an overjet or higher cusp angles to compensate and depend on a short balanced bite for stability, it is safer, because cusp height will be depended on for simultaneous contact on a number of posteriors, equalizing the pressure on all points of the restoration.

For partial restorations, grinding the cusp planes very slightly below actual coordination relieves lateral torque in mastication, provided a sufficient number of natural teeth remain to guide the mandible.

The individual tooth anatomy has been most neglected, and I cannot emphasize too strongly its development in restorations of every type.

Unworn natural teeth present almost entirely a line and point contact. All surfaces are rounded, and pits, grooves, rounded borders and narrow approximal contacts allow of ready escape of food. Little effort is required in mastication.

Continued wear eliminates escapes and constantly increases the surface contact.

We have been accustomed to grind to excess in coordinating our cusps and have thus increased a great many times the pressure exerted on soft tissues or abutments.

The patient can be made to bite at almost any point desired by developing a little closer surface contact at that point and only a line and point contact elsewhere. Increasing size of escapes will still further lessen possible pressure of food.

Such treatment will still allow using full size and number of teeth on all cases and maintain a balanced coordinated bite, and will be a substitute for one of the reasons for developing a rocking chair bite.

Summing up judicious use of line and point contact or as near line contact as possible and deepening pits, fissures and all breaks in the borders to as great an extent as efficiency will allow has been one of the greatest aids to eliminating trouble.

It is important that great care be used

to grip surfaces parallel to the line of settling under stress rather than those parallel with some chosen line for convenience of placing appliance.

If such surfaces clasped are not parallel to line of settling, they should be protected with the rigid grip of the tooth, and rests used, or if replacements are carried on soft tissues, stress breakers with rests on clasps should be used.

A rigid rest on one end of a saddle should not be used, the other end being carried on the ridge, unless mastication can be held close to the rest by giving a little more surface contact in occlusion on the first tooth, supplied next to the occlusal support, and unless the opposite end of the saddle bears on a broad firm portion of the ridge, carrying little stress of mastication by using line contact on occlusion at the end carried by the saddle bearing on the ridge.

As few parts as possible should be used, and as light construction as practical for the work expected, and a particular type of clasp should be used for a particular purpose.

As little clasp bearing on the tooth should be used as possible, by planning and executing clasps for a definite purpose.

Clasp forces should never be left unopposed and abutments should be saved from unnecessary stress of mastication.

A check should be kept on cases, seeing that mouth and dentures are kept clean and rebasing when necessary. Patients should be instructed in the care of the inside of clasps, using orange wood stick and flour of pumice, if necessary. The presence of altered lingual and buccal anatomy preventing massage of soft tissues and covering of tooth surface, threatening to cause decay, is to me the only unsurmountable disadvantage. Clean clasps, clean teeth and toothbrush massage of soft tissues will overcome these conditions.

Clasps are bent to fit the model. Adjusting clasps in the mouth is unsatisfactory as it is difficult to judge the tension of each arm of the clasp and pressure on the abutment or displacement of saddles is liable to result.

A few safeguards on bending clasps are the following:

The start should be made on the lingual extremity of clasp.

Care should be taken to bend accurately as one proceeds.

In general, the flat surface of half round wire should be kept parallel with the surface it grips.

The completed portion of the wire is held in the pliers at the point marked, being bent with finger and thumb. Then only the last bend needs correction in case of a clasp which has been fitted previous to the last bend's not going to place.

Care should be taken not to mutilate models in fitting nor to get under bad undercuts.

One should hold in place on the model always at one original point with the finger tip and mark point where clasp breaks contact with the model.

The handiest plier is one with one-half cross-section of a half round wire cut in each beak of the pliers, close to the end of the plier, to hold the wire when bending against the greatest cross measurement, which bend should be made ahead of bends against the shorter cross section.

By these rules, one-half hour will be ample time to bend perfectly a fairly difficult clasp.

THE TREATMENT OF PYORRHEA BY SURGICAL EXPOSURE OF THE TISSUES INVOLVED*

By GEORGE W. SIMONTON, D.D.S., San Francisco, California

NUMEROUS surgical procedures, aside from root curettement, have been suggested from time to time for the eradication of pyorrheal lesions. Riggs, in the forties of the last century, practiced removal of the gum tissue over "pockets," with apparently good results; and there have been many modifications of this method since. Students of pyorrhea have suggested various ways of exposing the teeth and surrounding bone to the end that more thorough surgery might be possible. It is practically impossible to determine from the literature to whom the credit belongs for developing these open view methods. The idea is expressed in various places, and, for practical purposes, the ideas are quite similar. All of the suggested operations have had the purpose of permitting the greatest possible facility in the removal of foreign deposits from the roots and diseased tissues from the neighborhood of the teeth. The operation to be described follows, to some extent, the work of Zentler. This operation was selected because, as far as I have observed, little, if any, additional recession of the gum follows.

PREPARATION

The instruments, gauze, sponges, cotton, etc., are sterilized and placed conveniently near by, with a clean towel over them. The anesthetic is prepared. The patient is given an antiseptic solution, such as potassium permanganate or surgical solution of chlorinated soda (Dakin's) and is instructed to wash his mouth, being aided in so doing if necessary. With the exception of the anesthesia, this is the only medication used during the operation. The area selected for treatment is then infiltrated with freshly prepared procain-epinephrin solution. It is suggested that the anesthetic be dissolved in physiologic sodium chlorid solution to which a trace of magnesium sulphate (Epsom salt) has been added. A delay of ten minutes is advisable at this point for the purpose of allowing the anesthetic to act. (The less of the anesthetic used, the better.)

OPERATION

Areas in which the tissues are least diseased, near the limits of the field are selected. (There is no difficulty about treating the entire mouth at one time if desired.) At the points so selected, vertical incisions are made from 3 or 4 mm. beyond the depths of the lesions to the free gum margins. The incisions should be made on the labial or buccal surfaces. The soft tissues are raised with a suitable instrument (a blunt periosteal elevator) until the entire buccal or labial surface to be operated on is exposed to view and, in addition, 3 or 4 mm. of healthy tissue. The lingual gum tissues can usually be lifted without incisions, but if necessary incisions

*From the California Stomatological Research Group.

*Aided by grants from the Carnegie Corporation, the American Dental Association and the Associated Radiograph Laboratories, of San Francisco, Calif.

may be made here as well. However, incisions on the lingual or palatal surfaces will cause discomfort for some days after the operation, and for this reason

Fig. 1.—Condition before operation.

should be avoided when possible; whereas, raising of the tissue in these situations without incision seems to cause practically no afterpain. The exposed areas are washed by gentle syringing with warm physiologic sodium chlorid solution to remove blood and loose débris. Bleeding stops in a few minutes. With suitable curets and scalers, the deposits

Fig. 2.—Condition during operation; gum elevated.

are removed from the exposed roots, as are also what appear to be the decalcified edges of the alveoli, to sound bone, and any exuberant granulations from the periosteal surface of the gums. The dislodged material is washed with warm physiologic sodium chlorid solution. The junction of gum with bone is then scarified to secure a flow of fresh blood, and the gum is laid back in position in the blood. Medication is not to be used, as caustics and strong germicides (protoplasm poisons) interfere with healing and are unnecessary. The lips of the vertical incisions are sutured first, and, for this purpose, a small full-curved needle is most convenient, the suture being

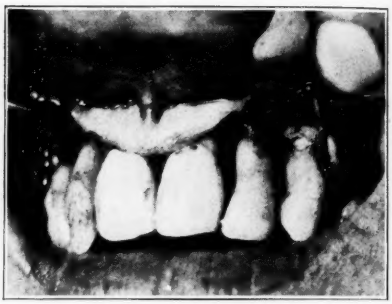


Fig. 3.—Appearance after curettement.

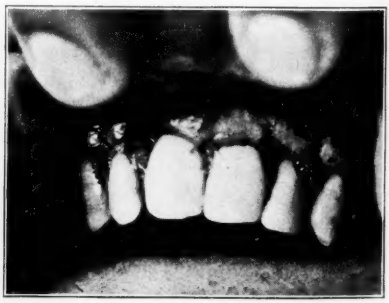


Fig. 4.—Gum sutured; packs in place.

passed through the entire thickness of the gum. One suture is usually sufficient, only enough traction being used to bring the edges of the wound together. Should this require force, it is better to let the

wound gape slightly and avoid tension, which will cause considerable pain. The margin of the gums is fitted back about the included teeth, and sutures are passed interproximally, an effort being made to bring the gums together between the roots if this can be done without creating tension in the tissues. A half curved needle is best for this purpose. Blood is allowed to clot in any unfilled spaces, and thin strips of plain or iodoform gauze are packed in the interproximal spaces, lightly, to prevent impaction of food on the gums during healing. The packs are changed daily, the spaces being cleansed by gentle washing with sodium chlorid solution each time. The sutures are removed on the fifth or sixth day. After-care consists only in cleanliness. There is no afterpain, as a rule. The teeth are not tender and may be used with at least as much comfort as before the operation. Often the teeth are more comfortable, and sensitiveness to thermal changes disappears.

esting to note how far the bony structures were destroyed in advance of the gum recession, a rather typical condition.

Fig. 5.—Appearance four weeks after operation.

The photograph also shows fairly well the mass of débris present as the blood was washed away before the exposure was made. The gum was not elevated between the central incisors in this case, as the tissues here seemed fairly healthy

Fig. 6.—Some useful instruments.

COMMENT

Figure 1 shows the condition before operating. Figure 2 shows the condition after the gum was elevated. It is interesting to note how far the bony structures were destroyed in advance of the gum recession, a rather typical condition.

and the pull of the frenum in labial movement makes it desirable to avoid interference in this region when possible. The granulations in the interproximal

spaces may be noted. These granulations appear also on the contiguous areas of the gum but are not well shown in the picture. Figure 3 shows the field after curettement, and Figure 4, the gum, sutures and packs in place. Figure 5 shows the condition four weeks after operation, during which period no treatment whatever was given. Figure 6 shows some instruments that I have found suitable for use in these operations. The left-hand instrument is a fine dissecting forceps, with serrated points that hold well in removing small granulomatous masses or fibrous material. The next is an all-steel scalpel with a blade about 1¼ inches long. The third is a blunt periosteal elevator with broad and narrow blades. The right-hand implement is a small and strong needle holder made by Pillings. Most of these instruments can be found in the armamentarium of any dentist. The scalers, curets, etc., may be of any kind to which the operator is accustomed. The kind of suture used is immaterial as long as it will hold. Absolute cleanliness is essential to the best results, but the use of drugs is to be avoided.

The advantages of this method are: Complete removal of deposits and pathologic tissues can be accomplished during the course of one appointment. The entire field is in view during operation, which contributes to thorough surgery. The method is painless and renders possible treatment that would not be possible in any case without the use of an anesthetic. It apparently does not cause additional gum recession. Finally, it must be admitted that this operation does not cure pyorrhea. It does preserve the teeth considerably beyond the time when they would otherwise be lost and eliminates a source of infection for the time being. This procedure is particularly useful where deep pockets exist.

Further observations will be offered from time to time on the progress of these cases and also a description of the hard and soft material removed from the teeth, jaws and periosteum.

AN APPRECIATION OF THE WORK AND CHARACTER OF JOHN CALLAHAN*

By CLARENCE J. GRIEVES, M.A., D.D.S., F.A.C.D., Baltimore, Maryland

(Read before the Ohio Dental Society, Dayton, Ohio, Dec. 2-4, 1924)

ON THIS occasion, it is fitting and seemly in me as the recipient *in absentia* of this, the highest honor that the dental profession can confer, to say a few words in appreciation of John Callahan's work for our beloved profession; a work in which he did not tire; a research in which his devotion was splendid.

Return in thought with me to the time of the much discussed root-canal filling problem. In this controversy, Callahan proposed, first, the opening of canals by dilute sulphuric acid; and second, the sealing of the minute apical interstices by a chloroform-resin solution.

In the light of the present knowledge of this subject, the discovery of these apparently simple processes, it would appear that the introduction of either at this time of doubt was enough to culminate and crown a lifetime of devoted service to dentistry and humanity.

It is now evident that Callahan was far in advance of the time in his insistent cry for facts! facts! to be discovered and taught in the study of the wet specimen, not by textbooks, for these are methods of the modern anatomist. In the study of the actual root apex, such are the present procedures that have produced practical results.

It is now admitted that the most practical things, those that have utility, are the most scientific.

These sections of the root apex, which no doubt many of those present have seen, were not cut on the plane surfaces necessary for microscopic study, whereby many areas are lost, but were ground with a flexible disk in the dental engine on the curving lines familiar to the dentist, which displayed the twisting and turning collateral curves of multiple foramina.

No doubt, many of those present recall the statement of Callahan that many molars had multiple foramina and his classic slides showing a delta of apical openings in a cuspid, while the general understanding gained from standard textbooks was that the tooth apex contained but one opening.

These statements made at this crucial period by Callahan seemed erratic and sensational to his best friends, and, as usual, he was right and in advance of the knowledge in this particular field.

This original research has been confirmed in practice by Howe and Johnston and it now stands proven by such histologists as Box and Noyes.

In all this reminiscence, I refer to the era in the history of dentistry covering the years 1915 and 1917.

All through this period, many made pilgrimages to the laboratory and offices of Callahan as the shrine where a

*Address given in response to presentation of the Callahan Award.

knowledge of the root-canal problem was to be had without money or price.

It is safe to assume that none of these many visitors failed to receive such a fraternal welcome as I did, of joyous hospitality, in the easy freedom of which all were instructed by the host, without the pedantic display of knowledge, so common among teachers who give private instruction for a consideration far beyond the ethical value of the facts imparted. This is a practice fast growing into a menace and disgrace, and if it is not limited by drastic action, it bids fair to be the ruination of our ethical status as a profession.

To these facts, I can testify, for I was a favored pilgrim to the home shrine of this great teacher of Cincinnati, where I was made cordially welcome by the glad hand of professional amity. John Callahan gave the best he had, and any amount of time, until it was embarrassing to see patients sent away, with the statement that he had a visitor, with never a boast, nor the pose of the savant, which I have met elsewhere in other office calls.

After a visit to his clinic and laboratories in the Cincinnati General Hospital and a good luncheon, which Callahan graced as an ideal host, the work began in his office laboratories. I was not a believer in the theory that chloroform-resin could be made to enter the trabeculae of wet bone and attach itself, but he demonstrated this to my entire satisfaction by forcing a solution stained with gentian violet into a wet mandible, from which the periosteum had been removed.

This was the period of study of comparative values and dangers of dilute sulphuric acid and sodium and potassium for opening root canals. To differentiate these, he sent to a neighboring butcher shop for some freshly cut bones. These we penetrated by flexible canal opening instruments, pumping these medicaments in, as in practice, with the result that the lumen of the opening was not disturbed by the sulphuric acid, while that upon which the kalium natrium was applied displayed large lateral areas in the cancellations of fresh bones.

I relate these apparently simple occurrences to illustrate the practical side of the research of John Callahan. I am happy and proud to dedicate to him the appended report of original research, which constitutes my last year's work in the Hunterian Laboratory of Johns Hopkins University.

This is a practical procedure through which microscopic slides made more than a year ago show at the present time the stains in enamel and pulp cells just as they appeared at the time of the grinding.

A TECHNIC FOR BOTH SECTIONS OF HARD AND SOFT OSSEOUS AND DENTAL TISSUES WITHOUT DISTORTION

It is most desirable to obtain sections for microscopic study by high power objectives of hard and soft tissues and their mutual relations without damage other than the slight changes that are to be expected in fixing agents. Especially is this true of osseous and dental tissues.

In the study of bone, if acids are used, the trabecular matter is lost and connective tissue fibers and cells are swollen and distorted; if the sections are ground, the hard areas persist but the soft tissues are destroyed.

In teeth, enamel is lost, in the decalcifying process, which generally leaves dentin an indeterminate mass, with little definition of tubuli and fibrils of the cemental lacunae and canaliculi.

In teeth, as in bone, ground sections rarely show any relation between the delicate pulp cells and associated hard dentin or periodontal fibers and the cementum or alveolus.

The process about to be described gives as thin sections of both hard and

soft tissues as the technician's skill will permit, and it shows the intimate relation of both, with little distortion of the cells or nuclei. An oil immersion may be used with comfort.

TECHNIC

(1) The specimens, as obtained, (about 1 mm. in thickness) are fixed in 10 per cent formalin (liquor formaldehydi) for three days, which will harden the tissue sufficiently and produce no decalcification.

(2) It is washed in running water for twenty-four hours; then in two changes of distilled water one hour each, and dehydrated in

(*a*) A 50 per cent alcohol for twelve hours.

(*b*) A 70 per cent alcohol for twelve hours.

(*c*) An 80 per cent alcohol for twelve hours.

(*d*) A 90 per cent alcohol for four hours each; making two changes.

(*e*) Absolute alcohol for four hours each, making two changes.

(*f*) A 50 per cent solution of alcohol and chloroform for two hours.

(*g*) Chloroform for two hours.

(*h*) A 5 per cent solution of "water-white" resin in chloroform for two hours.

(*i*) A 10 per cent solution of "water-white" resin in chloroform for two hours.

(*j*) A saturated solution of "water-white" resin in chloroform until the tissues are transparent.

(3) A piece of "water-white" resin is heated on a copper bar to the melting point (65 to 70 C.); then the tissue is transferred from the saturated solution to the fusing resin and allowed to saturate about one minute; it is then removed and allowed to cool, when it is ready to be rubbed down.

(4) The specimen is then rubbed down by hand on two grades of carborundum hones, using first the coarse and the fine, and then it is polished on one side, on a perfectly plain Arkansas hone under lukewarm water. It is important that all air bubbles be excluded. This is accomplished by evenly distributed pressure for a moment, when the slide and cemented specimen are immediately immersed in lukewarm water.

(5) After a perfectly plain polished surface is obtained, it is blotted and cemented smoothside down to a slide by melting a small bit of resin on a glass slide. It is important that all air bubbles be excluded. This is accomplished by evenly distributed pressure exerted for a moment, when the slide and cemented specimen are immediately immersed in lukewarm water.

(6) The other side of the section is then rubbed down on the two grades of carborundum hones and polished on this side on an Arkansas hone to as thin a section as the skill of the operator will permit.

(7) The slide with attached specimen is cleansed in distilled water and transferred to 20 per cent alcohol for fifteen minutes.

(8) It is then stained in 1 per cent of the following solution from twelve to twenty-four hours according to the thickness of the section, with the precaution that it be overstained, rather than understained.

Stock solution

Kresyl violet	1 gm.
Carbolic acid (5 per cent solution)	50 c. c.
Alcohol (95 per cent)	20 c. c.

This should be made by mixing the stain with the carbolic solution very thoroughly before adding the alcohol.

(9) The stained slide and attached sections are now rinsed in distilled water and transferred immediately to acetone, which dissolves the excess resin left in the tissues and dehydrates and differentiates the tissues under the microscope.

(10) The mounted specimen may now be cleaned in bergamot and creosote and either mounted on the slide on which it was rubbed down or carefully transferred to another slide and smaller cover glass. This is best done in a dammer gum (stock solution).

Slides prepared by this method have lasted for years, free from disintegration and without loss of color.[1]

1. After many experiments with various types, none of the grinding machines (microlethofer) have proved entirely satisfactory. The specimen is either detached or damaged and never reaches the desired thinness. In our experience, there is nothing that equals the feeling of thinness in the specimen as indicated by the finger.

DEPARTMENT OF DENTAL HEALTH EDUCATION

EVOLUTION OF RURAL CLINICS IN VIRGINIA

By N. TALLEY BALLOU, D.D.S.,* Richmond, Virginia

(Read before the American Dental Association, Dallas, Texas, November 10-14, 1924)

A GREAT impetus has been given mouth hygiene during the past few years and an enormous task confronts our profession in dealing with this subject. Great undertakings usually have small beginnings; and we know that in venturing into new fields of endeavor, mistakes must be made. Beginning our work in a small way, we made mistakes; but we trust that we have profited by them, and the small beginning has grown into rather a large undertaking. We believe that this undertaking must be handled on a statewide basis, and this paper is submitted with the sincere hope that other states may see that the movement has passed beyond the embryonic stage and is no longer an experiment, but a valuable phase of health work. It may be interesting here to say that, after a careful study of the Virginia plan, it has been adopted in its entirety by another state.

The first tangible step by Virginia in the direction of a recognition of dentistry as an integral part of preventive medicine was taken in 1916 when a bill was passed by the legislature providing that the governor should select a dentist as one of the members of the state board of health.

Since that time, with the exception of the period when he was in France, he has held this appointment, and, for a considerable period of time, he acted as chairman of the executive committee of the board.

The bill, approved March 1, 1909, and known as the West bill, made possible the creation of a mouth hygiene division in the state board of health. This bill provides that:

WHEREAS, the report of the education commission and the investigation of the state board of health reveal an alarming condition of physical defects of children, particularly in the rural schools, and

WHEREAS, the effective promotion of the health and normal physical development of the children requires health examination, health instruction and the conduct of wholesome physical activities; therefore,

1. *Be it enacted,* by the General Assembly of Virginia, that the board of supervisors of the several counties and the councils or other governing bodies of the several cities and towns be, and they are hereby authorized to make appropriations out of the county, city or town funds, as the case may be, to provide for the health examination and physical education of school children and the employment of school nurses, physicians and physical directors, and such appropriations shall be placed to credit of the county or city, or town school board. Previous to employment, all said nurses, physicians, or physical directors shall be approved by the health commissioner of the commonwealth, and the state superintendent of public instruction.

2. That an amount not exceeding one-half of the annual salary of each physical director appointed in accordance with section one of this act may be paid by the state board of

*Director of Mouth Hygiene, Virginia State Board of Health.

education to the local school trustees employing such physical director, and an amount not to exceed one-half of the annual salary of each nurse or physician appointed in accordance with section one of this act may be paid by the state board of health to the local school trustees employing such nurse or physician.

3. That after the first day of September, 1920, all pupils, in all the public elementary and high schools of the state shall receive as part of the educational program such examinations, health instruction, and physical training as shall be prescribed by the state board of education and approved by the state board of health, in conformity with the provisions of this act.

4. In order that the teachers of the commonwealth shall be prepared for health examinations and physical education of school children, every normal school of the state is hereby required to give a course in this subject, to be approved by the superintendent of public instruction and the state health commissioner, in health examination and physical education, including preventive medicine, physical inspection, health instruction and physical training, upon which course every person graduating from a normal school must have passed a satisfactory examination, and every normal school certificate shall, therefore, indicate as a prerequisite a knowledge of preventive medicine, physical inspection, health instruction and physical training.

5. The state board of education with the approval of the state board of health, shall establish regulations whereby on or after September, 1925, no applicant may receive a certificate to teach in the schools of this state who does not present, first, satisfactory evidence of having covered creditably an approved course in general physical education in a training school or course for teachers recognized by the state board of education as a school or course in good standing. But the state board of education may modify or waive entirely the requirements of this section whenever in its opinion such modification or waiver is necessary to prevent the impairment of the teaching force of the public school system.

6. The state board of education, with the approval of the state board of health, shall appoint a supervisor of physical education qualified and authorized to supervise and

Fig. 1.—Clinician and assistant on a mountain road.

direct a program of hygiene instruction and physical education for the elementary, secondary, and normal schools of the state, and shall appoint such other employees and authorize such expenses for personal service, printing and so on, as may be necessary to the proper and effective administration of the program authorized by this act.[1]

In order to carry out that portion of the West Law above referred to regarding physical inspection of school children, the state board of education requires to be given at all teacher training colleges a course which includes school hygiene, preventive medicine and physical inspection. These courses, which have been offered by the state board of health, are given by qualified instructors, assisted by the heads of the various divisions of the state board of health, who give special lectures on tuberculosis, malaria, sanitation, etc. Thus, the teachers have more than normal information concerning these subjects. This is also true of mouth hygiene, as the director of this division gives lectures at all of these schools as well as at the summer normals, laying particular emphasis on the various obvious defects to be found in the mouth and how best to detect them. As often as possible, this lecture is supplemented by an actual inspection of a child's mouth, and frequently by a thorough examination of the mouths of as many of the students as possible, the director explaining to the others the defects found and their possible bearing on the general health. So while this inspection by the teacher is naturally superficial, as compared with the examination given by the dentist, when defects are reported, they are actually in evidence.

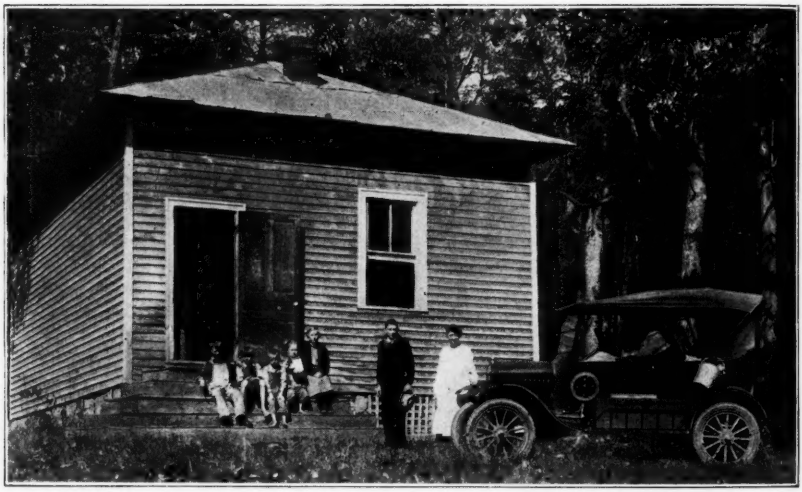


Fig. 2.—Arrival of clinician and assistant at a one-room school.

A correspondence course, consisting of twelve lessons and an examination, is also given by the state board of health for those teachers who graduated prior to the beginning of the session of 1921.

As modern scientific investigation proceeds, preventive medicine profits by

1. This act, passed by the General Assembly of Virginia, is quoted in its entirety for the information of those interested in such legislation.

a constantly increasing total of more or less exact data. It is sometimes difficult for the health officer to deal patiently with popular ignorance or misinformation; but it has been the invariable policy of the Virginia Health Department to instruct rather than to coerce; to make the people see the wisdom of health regulations rather than to force obedience to rules that might seem strange or unnecessary.

A further policy has been to move slowly, not to attempt too many things in a new field.

Fig. 3.—A typical mountain school; dentist, nurse, teachers and pupils.

This has been especially true in the application of the law requiring physical inspection. The teachers were given five years within which to qualify under the law. For the first year or two, the inspection was not very general throughout the state; but when various county superintendents realized the amount of good that was being accomplished, they became interested, and we now find the majority are requiring that the report of the inspection accompany the first month's report if the teacher expects to receive his or her salary.

The West Law is not presented to you as a model for legislation. In fact, it has glaring defects. But we may pardonably take pride in the construction that has been given to the law and in the manner of its operation in Virginia. There is, for example, in the language of the act nothing that would seem to justify the establishment of dental clinics; yet we are operating dental clinics under the law, and with funds provided for the working of the law.

WHAT THE TEACHERS FOUND

From a chart showing the results of the inspection made during the past school term, we find that, out of a total enrollment of 346,396 children in our rural schools, 288,433, or approximately 83 per cent, were inspected by the teachers. The failure to examine the remaining 17 per cent can be explained by the fact that the negro teachers have been slow in preparing themselves to do this work. We also find that 62,812 children, or 21.7 per cent, had defective vision; that 23,693, or 8 per cent, had defective hearing; that 153,793, or 53 per cent, had defective teeth; that 67,250, or 23 per cent, were underweight, and that 36,407, or 12 per cent, were mouth breathers. While the

teachers reported only 55 per cent of the children as having defective teeth, we, as dentists, know that the percentage probably should be at least 95. Nevertheless I think you will agree that the results of this state-wide inspection are extremely valuable.

In order that there might be harmony between the state board of health and the Virginia State Dental Association in any steps taken by the board toward the establishment of dental clinics in the rural sections, the association was approached, through the dental member of the board, at its meeting in 1920 for suggestions as to what should be done.

The association recommended that one of its members, who was an ex-president of the association and a man of wide acquaintance throughout the state, be appointed by the board of health for a sufficient length of time to make a survey of the state in order to ascertain the sentiment, not only among the profession, but also among the laity. This suggestion was cheerfully received by the board, and a survey, covering a period of four months, was made by this representative. He reported that, after conferences with health officials, physicians, dentists and district nurses, Red Cross, mission school officials and teachers, civic aids and public spirited citizens, in his opinion all mouth hygiene activities should be under the supervision of the state board of health, with the dental profession and board of education cooperating and assisting, and that a full-time dentist should be appointed to the staff of the state board of health; also that as soon as practicable, full-time men should be added as clinicians.

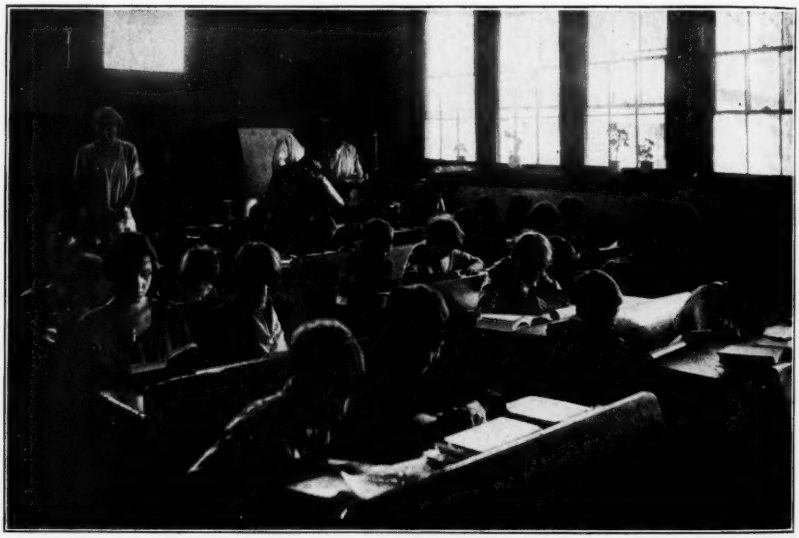


Fig. 4.—Clinic in operation in a one-room school.

This recommendation was accepted by the state board of health and I was appointed in February, 1921, as director of mouth hygiene for the term of one year, and was informed that the future of the work depended entirely on the showing made during the first year.

Later the facts regarding the number and the distribution of dentists in Virginia will be given, but here it may be well to give the determining reason for the clinics. Bad teeth *per se* are recognized as serious handicaps; but their collateral ill-effects are even greater than their direct. Food that is not properly masticated is digested with difficulty, and poor digestion precludes a host of troubles, undernourishment and bodily weakness being prominent among them.

The undernourished and weak child is not likely to be a good student, so the relief of such conditions may be regarded as a condition precedent to good school work; and since Virginia, like other states, is spending more money for education than for all other state purposes, it is a matter of grave consequence that such money should not be wasted; that the whole classroom should not be retarded by the slowness of children suffering from easily correctible defects; and that children so handicapped should be compelled to repeat their courses and thus increase the work of the teachers.

If there were time enough to conduct a thorough campaign of education and there were enough dentists to do the work, provided they could be induced to attempt it and the parents could be induced to pay, the dental clinics might never have been established; but neither of these conditions obtained. At another point in this paper, you will be told how meagerly rural Virginia is supplied with dentists; and if we should have to wait until the supply could be made adequate and until the people could be made to recognize the importance of the work, no living man would see even a good beginning of the undertaking.

So we began our clinics with the hope that they would be as little as possible eleemosynary, but determined to do the work no matter how the costs were to be met.

A certain portion of the funds provided for child welfare work under the general health appropriation was set aside to assist the counties in financing the clinics, with the understanding that the state and counties should share the costs equally. In the very beginning, three questions came up for decision:

1. What children should receive the benefits of the clinics?

After conferences with dentists, nurses and school authorities, it was decided to take the children in the schools between the ages of 6 and 12, inclusive, or in graded schools through the sixth grade, realizing that this is the period in the child's life when most good can be accomplished from a dental standpoint.

2. Should the children bear any part of the cost of the clinic?

It was decided that the parents should pay a small sum for each operation when they were able to do so, but that treatment would be refused to no child because of its inability to pay.

3. How could the work be accomplished?

It was decided to use full-time clinicians, and two were employed. They started work in two counties, one in the Tidewater section and the other in the mountains in the western portion of the state. In two other counties, public health nurses took the children to dentists' offices; while in still other counties, local dentists were employed by the day to go to the schools.

After a careful analysis of the results of these three methods, it was decided to abandon the last two, for the following reasons:

It was impracticable to bring to a dentist's office those children living at a distance from the local dentist, and these were the ones who generally most needed the services of the clinic. It was found that the dentist who agreed to visit the schools for one or more days very often had to break the engagement because of emergency calls made on him by his regular patients, who could not be ignored. It was found difficult at first to secure sufficient men to run the few clinics

Form 1 **ORIGINAL**

Grade

Age

----------, County ----------, School
Name of Child (surname first) Name and Address of Parent or Guardian

STATE BOARD OF HEALTH—DIVISION OF MOUTH HYGIENE
BUREAU OF CHILD WELFARE

To the Parent or Guardian:

The Dental Defects marked below have been found in your child's mouth and should receive prompt attention.

Permanent Teeth

	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	
Right																	Left
	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	

Temporary Teeth

	E	D	C	B	A	A	B	C	D	E	
Right											Left
	E	D	C	B	A	A	B	C	D	E	

----------, D. D. S.
Inspector.

What the Symbols Mean

O—Extraction necessary.

T—Treatment necessary.

X—Filling necessary.

[ ] Check—Cleaning necessary.

Inspector's remarks: ----------

YOUR CHILD'S TEETH

The care of the temporary teeth is just as necessary as the care of the permanent teeth, because they play an important part in the development of the jaws. Contrary to the general belief, they should be filled and preserved until they are pushed out by the permanent teeth. *Every child needs every tooth every day,* and as soon as a cavity is found either in a temporary or a permanent tooth it should be filled immediately. Be sure to watch the first permanent tooth; it is the sixth tooth from the middle line in front on either side, both above and below, and comes thru the gum about the sixth year. This is the most important permanent tooth of all and should be carefully guarded.

You are urgently advised to take your child to your family dentist at once. If for any reason this is impossible, thru an arrangement with the State and county, dental service is offered at your school at approximately one-third of the usual cost, the State and county paying the remainder. If you wish the work indicated on the reverse side of this card done at the school clinic, please sign below and return with $----------, which is the part of the cost you are expected to pay.

Teacher.

I desire this work done at the school clinic, and enclose herewith $----------, which I understand is the amount I am expected to contribute towards this work.

Parent or Guardian.

Fig. 5.—Above: Examination chart used in clinics. The reverse side is blank. Below: Notice to the parents. On the reverse side is a duplicate of the examination chart.

contemplated, possibly because of the belief that it was only a temporary movement and would die a natural death in a short time.

When this department was organized, the state was paying one-half of the gross cost of such clinics as had been conducted, the other one-half being paid by the counties, and had agreed to settle on this basis for all the clinics promised up to March 1, 1922. Owing to the fact that, on that date, only approximately one-third of the amount necessary to carry on the work for the year as outlined was available, it was found necessary to require all of the counties holding clinics to account to the state for the contributions received, and all settlements made since March 1, 1922, have been on the basis of one-half of the net cost of each clinic.

DENTAL SURVEY

The necessity for our rural dental clinics may best be appreciated by a study of the map that forms part of Virginia's exhibit at this session. This map shows the distribution of the dentists throughout the state. It will be seen that there are 363 dentists located in the twenty cities of the state, leaving only 350 men to take care of the work in the 100 counties. There are fifteen counties without local dental service of any character whatever except that which is furnished through our dental clinics. In addition, there are sixteen counties with only one dentist each, and twelve counties with only two dentists each. In these counties with a total population by the 1920 census of 514,645, in which is included a school population of 163,146, there are only forty-three men to take care of all local dental work.

While some counties with three or more men seem to have adequate facilities, the topography of the county may be such that a comparatively small proportion of the population is so situated that it can take advantage of the services of these men, without great inconvenience and expense.

Virginia is a conservative commonwealth. Socialistic ideas are not generally popular. State medicine, as it is called, is not an issue and never has been. Nevertheless, the state that spends so much to educate her children must inevitably take into consideration obvious handicaps to education. This consideration was the reason and motive of the West Law.

We started with a survey. We needed definite information, and the survey furnished it; but, even with this preliminary information, we were without guides for our course. So we had to experiment, to plan carefully, and work in a small area.

During the first year, we had two full-time clinicians and two part-time ones, who performed 14,561 operations for 4,803 children.

During the second year, we had seven full-time clinicians, who performed 44,193 operations for 10,973 children.

During the third year, we had nine full-time clinicians, who performed 47,198 operations for 11,368 children.

The fourth year is not yet half run, but we have thirteen clinicians and the total operations will no doubt show a proportionate increase.

THE FINANCIAL PLAN

Our financial plan is as follows:

1. The salary and traveling expenses of the director, the cost of all printing, etc., and the salary of a full-time secretary are paid by the state board of health.

2. The county makes application to the state board of health for a specified sum, not to exceed $500 for any one year, with the understanding that an equal amount is to be appropriated by this county, to be available when the clinic started in the county.

3. The county conducts the clinic at a time specified by the director of mouth

hygiene, the time to be set as nearly as possible to suit the wishes of the county.

4. The clinic must be conducted under the direction of the state board of health, and by the full-time clinician employed by it.

5. All children, when financially able, contribute toward the cost of the clinic the sum of 50 cents for each separate operation, but no child is to be refused treatment because of its inability to pay.

6. The work done by the clinicians is limited to school children under 13 years of age, or, at the discretion of the county authorities, to the pupils from the primary to the sixth grade, inclusive, in graded schools.

7. The net cost, that is, the difference between the fees collected and the total cost of the clinic, is paid equally by the state and county; provided, however, that the state's share must not exceed $500.

8. The chair used by the clinician is furnished by the state board of health at a monthly rental of $3.00. This rental is to be paid by the county and not out of the joint fund.

9. An engine and all necessary operating instruments are furnished by the clinician free of charge, with the understanding that any instruments broken are to be replaced by the county in which the clinic is held.

10. All necessary materials are furnished from the office of the director on requisition, and must be paid for out of the county and state fund.

11. The transportation of the dentist into the county to report for work is chargeable to the joint county and state fund. All transportation within the county is to be paid for entirely by the county.

12. All bills for materials and the salary of the dentist must be paid on the first day of each month by the county, and a report furnished the director of mouth hygiene. On receipt and approval of this report, reimbursement will be made.

13. Clinicians are paid $9.00 a working day for the first year, and $10.00 the second year, and at the end of the second year, are placed on a maximum salary of $11.00 a working day.

14. The clinicians are required to work a minimum of six hours a day with the exception of Saturday, which is a half holiday, but for which a full day's salary is allowed.

15. The clinician is not allowed to have any outside practice. He must take care of his board and all other personal expenses with the exception of transportation.

16. No allowance is made out of the joint fund for the services of a nurse or an assistant.

17. The clinician, in moving from one county to another, is allowed his actual transportation expenses and one day's salary. All transportation within the county, however, must be taken care of entirely by the county, as an offset to the general overhead expense.

18. We have a large negro school population, but we do not have mixed clinics. So far, we have been unable to interest the negroes sufficiently to demand the services of more than one negro clinician. This man handles all calls made for clinics among negro children.

19. The annual appropriation to the bureau of child welfare is only $37,000. There is no direct appropriation for the mouth hygiene division.

The fixed policy of the state board of health is that $12,000 a year, or approximately one-third of the total appropriation, shall be segregated for the mouth hygiene division. Of this amount, one-half is taken up in overhead as follows: Salary of director, $3,600; traveling expenses of director, $1,200; salary of full-time secretary, $1,200.

The cost of printing, stationery, postage, etc., is taken care of out of the general appropriation made for this

purpose. There is no expense for office space, as the state board of health occupies two entire floors of the new thirteen-story state office building recently erected at a cost of $1,250,000. This leaves only $6,000 of the annual appropriation available for aid to the counties, but an equal amount is provided by the counties, giving us a guarantee fund of $12,000.

As the average net cost of the clinics is only about one-third of the gross cost, at present, we really have available about $36,000 for the clinics, which are held almost entirely during the nine school months.

Beginning in April, 1921, with a full-time dental director and two full-time clinicians, and a small amount of work being done by the part-time clinicians, we have gradually eliminated all of this part-time work and have added slowly to our force until, at the beginning of the present school year, September 1, 1924, our force consisted of the following: a full-time director of mouth hygiene, a full-time secretary and thirteen full-time licensed clinicians.

The accompanying table is a summary of the work accomplished from April 1, 1921 to September 1, 1924.

WORK ACCOMPLISHED FROM APRIL 1, 1921 TO SEPTEMBER 1, 1924:

Clinics held	61
Pupils examined	71,852
Pupils treated	36,090
Extractions	28,605
Amalgam fillings	59,240
Cement fillings	15,154
Synthetic fillings	2,905
Pulps capped	2,009
Cleanings	22,633
Total number operations	130,546
Contributed by children	$39,655.13
Cost to state	22,595.99
Cost to counties	17,946.62
Cost to clinics	80,197.74

While we use silver nitrate to sterilize and to stop decay, we do not count such treatments as operations, and the figures given above are for teeth actually restored by fillings. Wherever indicated, a cement base is used, but this is not counted as a separate operation.

SUPPLEMENTARY WORK

Since the passage of the Sheppard-Towner bill by Congress, Virginia has been doing intensive maternity and infant welfare work.

During the summer of 1923, one physician held clinics throughout the rural sections. As an experiment, our woman dentist was appointed a member of the clinic staff and did considerable educational as well as correctional work among the preschool children and the mothers.

The response to this work was so encouraging that during the past summer, with two women physicians, we went into this work on a much larger basis, placing one dentist with each physician and, through our whole-time health organizations, and in connection with several of our county nurses, five additional clinicians, making a total of seven clinicians, engaged in this work from June 1 to September 1.

It was our plan to take, preferably, those children who would enter school in September, and the mothers during the six months preceding and six months following confinement. The following is a summary of the work accomplished during this period: patients examined, 2,814; patients treated, 2,362; extractions, 1,615; amalgam fillings, 2,445; cement fillings, 1,626; cleanings, 1,671; total number of operations, 7,357.

We are continuing this work. Each school clinician is required to spend one day a week, or its equivalent, in preschool work. In addition to the foregoing, our clinicians take care of the inmates of the state school for deaf and blind, boys' reformatory, girls' reformatory, orphanages and mountain mission schools desiring services.

The tuberculosis sanitoriums have clinicians who give dental service to all patients. Inmates of penal and insane institutes receive dental treatment by

qualified practitioners. Definite appropriations are made for this work.

Many inquiries have been made as to the method of transportation and the location of the clinics. Figure 1 shows the clinician and assistant on the road surrounded by mountains. Figure 2 shows their arrival at a one-room school with chair and engine base on the running board. The water bucket is fastened to one of the supports. The engine case, supplies and bracket stand are carried on the back seat.

Figure 3 shows a typical mountain school with dentist, nurse, teachers and children. Figure 4 is an interior view of a one-room rural school. The pupils are studying their lessons while the clinic is in full operation in the rear of the room. We find that after an hour or two the clinic does not interfere with the class work.

Figure 5 shows the form of examination chart used in our clinics and the notice to the parents.

DISCUSSION

E. A. Early, Columbia, S. C.: Two years ago, South Carolina appropriated a small amount of money to start dental clinics, under the direction of the state board of health. The position of director of these clinics was given to me. In the main, we adopted the Virginia plan. It has worked very successfully with us. One important exception to this plan should be noted, however. In our case, it was not possible to secure from the state an appropriation sufficient for the support of the work or even sufficient to equal the county appropriation. Consequently, we have had to provide for the work strictly on a county basis.

That has meant a great deal more work, but it has had its advantages. I want to tell you briefly how we got started. I began work only last year, and as stated, with no money to work with. In the beginning, I thought I would be well pleased if I could get a school to start this work in, and make a demonstration. I did this, and the result was that it was only a short time before I learned of a school in another part of the same county that wanted a clinic also, and then of another school, and after that another. So with this as a beginning, I worked out a plan under which I would go to a county and ask them to put up the amount of money that I estimated it would take to finance the clinic over and above the 50 cent fee, just as is done in Virginia; except that in Virginia the state puts up the money. It took some little time to get this plan going. At first, I had to call on outside organizations for assistance—parent-teacher associations, mothers' clubs and Kiwanis clubs; and private individuals. Moreover, at first, we underestimated the amount it would take to run the clinics, and if it had not been for the fine spirit of the young men doing the work, we would not have been able to accomplish what we did accomplish. They were so interested in it and so enthusiastic that they kept it going practically without any pay at all for a time. One of these young men was Dr. McFall.

It was in this way that we were able to set the plan up and get it established in spite of the lack of financial support.

It was a hard proposition then, but I am glad now, looking back, that we had to go through with that preliminary stage, because it did more to sell the clinics to the people than could have been done in any other way. As I stated, by the plan we are working on now, the state will appropriate enough money to enable the director's office to function, and then let each county that wants a dental clinic put in an appropriation to provide for one. I have clinics going now in eleven counties, with a man to each county, and seven other counties have their money ready. Clinics will be started in these counties as soon as we can get the right kind of men to conduct them. This is not so easy. We pay a salary of $250.00 a month and require the clinician to furnish his own car, the expense of operating the car being paid by the county. I think that, with this arrangement, we ought to be able to get very competent men, but of course it takes some time to build up a force.

Louise C. Ball, New York City: A compulsory course in preventive dentistry in the normal schools for training teachers is the most practical plan for a short-cut to state dental health education. Public school children are the greatest advertisers and missionaries of health ideas in the home. Teachers, equipped with definite instruction in mouth hygiene can give real help to the children from the kindergarten up, and can secure the cooperation and interest of the parents.

R. S. Towne, Bismarck, N. D.: All of the papers and discussions that we have listened to in this Section have been confined almost exclusively to city activities. Dr. Ballou, in his work and in his paper, has quite conclusively answered the question of the proposition from the rural standpoint.

DENTAL HEALTH PROPAGANDA IN GREAT BRITAIN

IN the effort to improve the general standard of health in Great Britain, much valuable and important work has been, and will continue to be, done by the ministry of health, the board of education and their officials, medical associations, doctors, municipalities and local authorities, hospitals, licensing bodies, the medical services of the army and navy, parliament, dentists and individual philanthropists.

Necessarily and inevitably, far too great a proportion of the effort has to be, and is, directed to the alleviation or cure of diseased conditions already incurred, which might, in many instances, have been prevented had the sufferers possessed the necessary knowledge of the means of prevention, prophylaxis or avoidance, and the will or opportunity to avail themselves of these measures. As has often been said, "If disease is preventable, why is it not prevented?"

Of all the evils that afflict humanity, there is none to which this inquiry is more pertinent than it is to dental disease. In the field of preventive medicine, the cultivation of habits of careful and regular attention to oral hygiene and treatment of the teeth would seem to promise a bountiful harvest of improved health and increased efficiency.

The Dental Board of the United Kingdom has, by Section 10 of the Dentists' Act, 1921, power to allocate any moneys received by them "to any public purposes connected with the profession of dentistry as the board with the approval of the council may determine." The Dental Board, being convinced that the education of the public in oral hygiene and dental health is such a public purpose, both urgent and of prime importance, appointed a committee, Nov. 14, 1923, to consider the need for dental treatment.

Since then, the committee has been engaged in clearing the way for the effective exercise of its activities. It has drawn up a leaflet for the use of teachers and others, which should serve as a basis for instruction in the care of the teeth, and this leaflet has been approved by the authorities concerned.

The committee has acquired copies of cinema films dealing with the subject, and are arranging for their exhibition. Broadcasting of a talk on dental health has also been arranged.

Recognizing as one of its duties, the coordination of different agencies, and the adaptation of various methods to a common aim, the committee decided to call a conference of representatives of bodies and associations engaged in, or interested in, the promotion of instruction in dental health.

Invitations to send representatives to the conference have been sent to:

British Dental Association
(to include *The British Dental Journal*)
Incorporated Dental Society
(to include *The Mouth Mirror*)
National Dental Association
United Dental Association
British Society of Dental Surgeons
Society of Medical Officers of Health
Dental Officers Group
Public Dental Service Association
Ministry of Health
Board of Education
National Confederation of Employers' Organizations
British Broadcasting Company
Food Education Society
National Association of Insurance Committees
The Dental Surgeon
The Dental Practitioner
The British Journal of Dental Science
The Dental Record
The Amalgamated Dental Company
Dental Manufacturing Company
Cottrell & Company
S. S. White Company
Association of Dental Manufacturers and Traders

This conference will be held, Jan. 16, 1925, and will be addressed by the Right Honorable Francis Dyke Acland, chairman of the board.

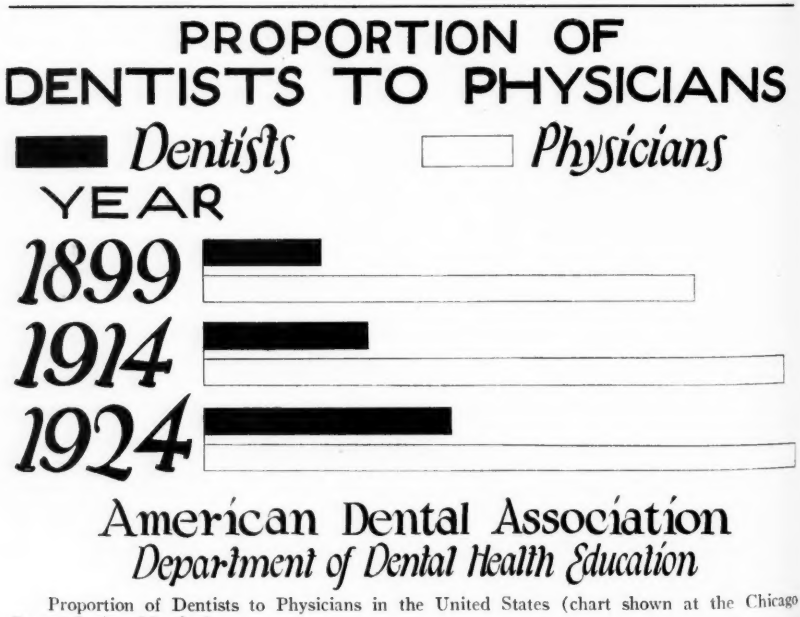
The discussions of the conference will include:

I. Address—By the chairman of the board.
II. Objects of propaganda.
III. Methods—The members of the conference will be invited to express their views on, and to suggest appropriate methods of instituting instruction in oral hygiene and dental health of:
  (1) The general public, by:
    (a) Publications:
      Leaflets
      Pamphlets
      Handbooks
      Literature for distribution by doctors and dentists.
    (b) Publications of articles in:
      Newspapers
      Journals
      Magazines
    (c) Newspaper and other advertisements.
    (d) Lectures.
    (e) Conferences.
    (f) Health weeks. The provision of dental health exhibits at medical, dental and health society meetings.
    (g) Cinematograph films.
    (h) Broadcasting.
  (2) Children of school age, by:
    (a) Leaflets and pamphlets
    (b) Lectures.
    (c) Lantern slides.
    (d) Cinematograph films.
    (e) Toothbrush drill.
IV. Finance.
V. Organization.

It is confidentially expected that under the guidance and with the support of the Dental Board, an effective and productive campaign in the interests of dental health will now be undertaken.

Sir George Newman, chief medical officer of the board of education and the ministry of health, speaks of the "dental problem" by which he means "the prevalence all over the country of a high degree of dental defect, deleterious in itself, and far-reaching in its injurious effects on the health of children, adolescents and adults."

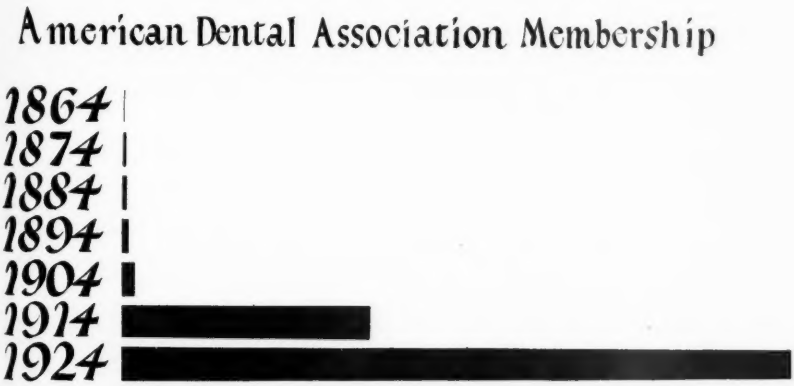
The problem calls insistently for solution. The board intends to deal with it and to do everything possible to remove the stigma and reproach that attach to a community in which the most easily prevented of diseases is not prevented.



Proportion of Dentists to Physicians in the United States (chart shown at the Chicago Dental Society Meeting).

EXHIBIT AT MEETING OF CHICAGO DENTAL SOCIETY

The Department of Dental Health Education of the American Dental Association presented an exhibit at the annual meeting of the Chicago Dental Society, held at the Drake Hotel, Feb. 21-23. A map showed the states licensing dental hygienists; a graph gave the proportion of population to the number of dentists and physicians in the United States; another, the proportion of dentists to physicians in 1895, 1914 and 1924, and a third the growth in membership of the American Dental Association by ten-year intervals, beginning with 1864. There were four unit exhibits: "Eating for Teeth", "Use Nature's Sugar Bowl," "Caring for Teeth" and "See Your Mouth as Others See It;" and there was a shelf of books on health. Reprints and literature were displayed as well as posters, slides and picturols. A pleasant contact was made with many dentists previously unfamiliar with the work of the department. Many public health and school nurses visited the exhibit, eager to obtain material that might be used in their work.



Growth of Membership 1864-1924 (Chart shown at the Chicago Dental Society Meeting).

SLIDES ON BRUSHING OF TEETH

Below is a list of slides on the brushing of teeth. In offering these the American Dental Association does not endorse any particular method of brushing nor any special toothbrush. They are offered at 35c each.

The complete set will be sent on approval in order that a selection of the slides may be made if the complete set is not desired.

Sketch showing man

401 Cleaning the outside of the side teeth
402 Cleaning the outside of the upper front teeth
403 Cleaning the outside of the lower front teeth
404 Cleaning the inside of the upper side teeth
405 Cleaning the inside of the lower side teeth
406 Cleaning the inside of the lower front teeth
407 Cleaning the inside of the upper front teeth
408 Sketch showing brush in proper position to brush back of last molar
409 Sketch showing brush in position for brushing lower lingual surface
410 Sketch showing in and out stroke for brushing roof of mouth.

"MILADY'S DRESSING TABLE"*

By Mary Newell, D.D.S., Chicago, Illinois

Perhaps the most direct appeal to the human mind is through the sense of sight. The general public and even the profession may be instructed in proper selection of foods; they may read, in books, pamphlets, and bulletins, of proper foods; they may hear eminent dietitians lecture on foods; yet it would seem that a better means of impressing food selection on the mind, would be a display of health-building foods in an attractive manner.

It is an established fact that the American public does not consume enough fruits and vegetables, their main diet consisting of meat, potatoes, white bread and too much pastry, candies, etc.

In this day and age of beautiful and vain women, an effective presentation of a clinic on diet is made through an appeal to woman's vanity. A dressing table equipped as shown in the accompanying picture, with fruits and vegetables to represent the various cosmetics commonly used, attractively visualizes what dietitians are striving to teach.

Carrots have always been famed for their ability to improve the complexion, so the jar containing carrots represents complexion cream. Beets, a gorgeous red, readily suggest the rouge. Onions, freshly peeled, are shiny and so suggest the once rather common use of belladonna as an eye sparkler. What could be a better representative of vanishing cream than a bottle of pure cream from the cow? When potatoes are baked, they become fluffy; thus the powder puff is represented by the potato. Iron should be included in all diets: the "washer-like" fittings on the curling iron are suggestive of the slogan "eat more raisins". Fruits and nuts are represented in the "perfumer," built up of apples, pears, oranges, grapes and nuts. The skin becomes softer when two apples a

*Clinic presented at the annual convention of the Chicago Dental Society, Chicago, Ill., Jan. 23, 1925.

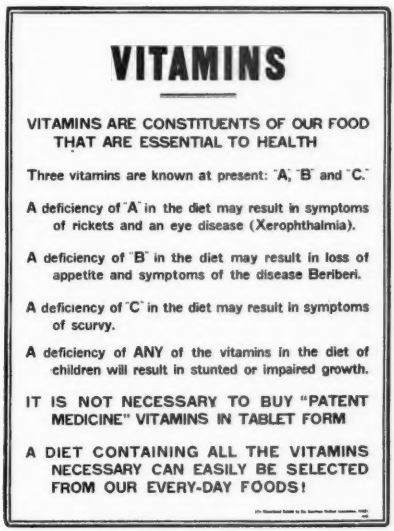
Health Exhibit "Milady's Dressing Table."

day are consumed—"skin softener." Cleanliness is also an important factor; thus, the miniature bath tub with the label "Eau-de-Bain." Toothbrushes are used to represent vanity brushes. And last but not least there is the "baby" toothbrush with "celery" bristles, to encourage "brushing the teeth with vegetables."

With a diet including an ample supply of fruits, vegetables and milk, balanced with such proteins as the individual case demands, there is a suggestion of a rational answer to the problem of proper food selection. Add to this, cleanliness of the body surface through sufficient bathing, cleanliness of the mouth through proper prophylaxis, and cleanliness of the alimentary tract through ample consumption of water. All of these factors in an adequate diet are suggested in the accompanying picture. If this means of demonstrating the subject of diet is attractively carried out, it may leave a deep and lasting impression.

VITAMINS

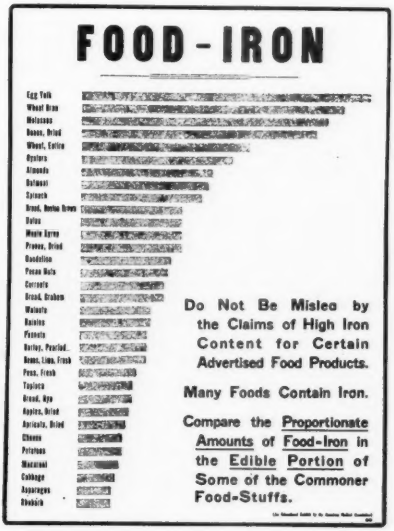
The educational posters shown on this page, put out by the Propaganda Department of the American Medical Association present graphically the vitamins and iron in the most commonly used foodstuffs.


VITAMINS
VITAMINS ARE CONSTITUENTS OF OUR FOOD THAT ARE ESSENTIAL TO HEALTH
Three vitamins are known at present: "A," "B" and "C."
A deficiency of "A" in the diet may result in symptoms of rickets and an eye disease (Xerophthalmia).
A deficiency of "B" in the diet may result in loss of appetite and symptoms of the disease Beriberi.
A deficiency of "C" in the diet may result in symptoms of scurvy.
A deficiency of ANY of the vitamins in the diet of children will result in stunted or impaired growth.
IT IS NOT NECESSARY TO BUY "PATENT MEDICINE" VITAMINS IN TABLET FORM
A DIET CONTAINING ALL THE VITAMINS NECESSARY CAN EASILY BE SELECTED FROM OUR EVERY-DAY FOODS!

Value of vitamins in the diet.

VITAMINS IN FOODS
"A" "B" "C"
BREAD, WHITE (WATER) ? + –
" , " (MILK) + + ?
" WHOLE WHEAT (RED) + ++ ?
" , " " (MILK) ++ ++ ?
BARLEY (WHOLE) + ++ –
CORN, YELLOW + ++ –
OATS + ++ –
MEAT, LEAN –++ +? +?
BEEF FAT + – –
MUTTON FAT + – –
PIG KIDNEY FAT ++ – –
OLEOMARGARINE + – –
LIVER ++ ++ +
KIDNEY ++ ++ +?
BRAINS + ++ +?
SWEETBREADS + + ●
FISH, LEAN – + ●
" , FAT + + ●
" , ROE + ++ +?
MILK, FRESH +++ ++ +V
" , CONDENSED +++ ++ +V
" , DRIED, (WHOLE) +++ ++ +V
" , SKIMMED + ++ +V
BUTTERMILK + ++ +V
CREAM +++ ++ +V
BUTTER +++ – –
CHEESE ++ + ●
COTTAGE CHEESE + + ●
EGGS ++ + +?
ALMONDS + + ●
COCONUT + ++ ●
HICKORY NUTS + ++ ●
PEANUTS + ++ ●
PECANS + + ●
WALNUTS + ++ ●
TOMATOES (CAN BE CANNED) ++ +++ +++
BEANS, KIDNEY ● +++ ●
" , NAVY ● +++ –
" , STRING, (FRESH) ++ ++ ++
CABBAGE, FRESH, RAW + +++ +?
" , COOKED + ++ +?
CARROTS, FRESH, RAW ++ ++ ++
" , COOKED ++ + +
CAULIFLOWER + ++ +
CELERY ● + ●
CUCUMBER ● + ●
DANDELION GREENS ++ ++ +
EGGPLANT, DRIED ● ++ ●
LETTUCE + ++ +++
ONIONS ● ++ ++
PARSNIP –? ++ ●
PEAS + ++ +?
POTATOES (BOILED IN SKIN) ● ++ +?
" (" 1 HOUR) ● ++ +?
" (BAKED) ● ++ +
SWEET POTATOES + ++ ●
RADISH ● + ●
RUTABAGA –? ++ +++?
SPINACH, FRESH +++ +++ ●
" , DRIED +++ ++ ●
SQUASH, HUBBARD ++ ● ●
TURNIPS –? ++ ●
APPLES + + +
BANANAS ++? + +
GRAPE JUICE ● + +
GRAPEFRUIT ● ++ ++
LEMON JUICE ● ++ +++
ORANGE JUICE + ++ +++
PRUNES ● + –
RASPBERRIES (FRESH OR CANNED) ● ● +++
+ contains the Vitamin
++ good source of the Vitamin
+++ excellent source of the Vitamin
– no appreciable amount of the Vitamin
? doubt as to presence or relative amount
● evidence lacking or insufficient
V variable

Vitamins A, B and C in various foodstuffs.



Comparative amount of iron in various foodstuffs.

FIELD NOTES*

Pennsylvania is to be congratulated. The state celebrated dental health week from February 22 to 28. "Watch Your Teeth" was the slogan which appeared on street cars and automobiles, while slides with appropriate models were shown at motion picture houses. Series of articles appeared in newspapers and exhibits were featured in store windows. Local civic clubs had speakers and talks were broadcast. An active oral hygiene campaign was conducted among school children. The health week was in charge of Dr. C. J. Hollister, chief of the dental division of the Pennsylvania Department of Health, and chairman of the Mouth Hygiene Committee of the Pennsylvania State Dental Society.

Dr. W. O. Talbot reports that the Fort Worth, Texas, Dental Society is furnishing copies of "How to Build Sound Teeth" and "Children's Teeth—How to Use and Keep Them" to all of the local school teachers.

The South Dakota State Dental Society, through its oral hygiene committee, has purchased "Tommy Tucker's Tooth" for use throughout the state. Dr. R. H. Collins, chairman of the committee, writes that the state has been districted and that the dentists representing the various districts may keep the film for two weeks. Dentists get in touch with school authorities, and in this way the entire state will be covered, and all school children will get the message of mouth hygiene.

The Division of Dental Hygiene of the Maine State Department of Health conducted an oral hygiene demonstration in Belfast, February 9 to 28, in order to interest citizens of the community and of surrounding communities in establishing community dental health programs.

Texas is to have a state-wide dental health week, April 13 to 18, under the direction of the Committee on Mouth Hygiene and Public Instruction of the Texas State Dental Society. Dr. W. O. Talbot is chairman of the committee. The school work is under the direction of Dr. Trim Houston; rural work under Dr. C. E. Stephens; civic under Dr. W. H. Scherer, and industrial under Dr. W. P. Delafield.

The Hollywood Kiwanis Club is building and equipping a dental clinic as an addition to the hospital at the Los Angeles Orphans' Home. Operative service will be furnished by the Dental Department of the University of Southern California.

In Elkhart County, Indiana, 357 children of preschool age were examined in the thirteen working days there and 480 persons attended the motion picture lectures. The films used were "Our Children," "Saving the Eyes of Youth" and "Tommy Tucker's Tooth."

*The Department of Dental Health Education will be glad to receive items of news along the lines of education in dental or general health.

The Journal of the American Dental Association

5 North Wabash Avenue, Chicago, Illinois.

Please send in promptly notice of change of address, giving both old and new. Important information regarding subscription price, etc., will be found in the advertising pages.

Editorial

POSTGRADUATE STUDY

The term postgraduate study carries with it the full thesis of this editorial. Let us not confuse it with graduate study, a very different thing, but confine it entirely to studies following graduation that do not aspire to a degree. These studies run an extensive gamut of endeavor, some undirected and some directed, some exceedingly superficial and others marked by some seriousness. In the main, the value of such courses is negligible and, in the last analysis, depends entirely on what the individual brings to them. How they come about and what constitutes their fundamental weakness is the concern of this discussion.

While a man is at his daily task, discoveries and developments accumulate so rapidly that in a short while he is muttering to himself that he is behind the times. Or the journals on his reading table pile so high and the list of articles and books set aside for future perusal grows so long that again he mutters that he can't catch up. A sense of inevitability settles upon him, an uneasy, unwelcome, paining sense. No man welcomes from any source the accusation that he is not keeping up with his profession. But what can he do about it?

At this point comes the short course in some subject or group of subjects that tempts him; or a study club is begun, to which specialists are invited to speak for a night or a number of nights; or, mayhap, on his own responsibility, an individual announces a school in anesthesia, periodontia or surgical extraction. The cost may be low or high according to the student's interest, his ability to pay or the prominence of the instructor. At all events, the acquirement of knowledge, skill, up-to-dateness is at hand. Money is a secondary consideration; rating, standing, personal pride is the primary issue—an important element. One's self-esteem is precious. Hence, men congregate willingly to don the three-league boots in which they may catch up with speeding events,

with hurrying time. Of these methods, the study club is the most popular at this moment which employs the lecture aided by illustrations and demonstrations. Attempts have been made in sequence studies of certain subjects, with small success.

Perhaps every member of such a body feels the insufficiency of its methods. He senses deeply and disturbingly that they irritate rather than soothe his need. It is only in the technical subjects that success is approached, for obvious reasons. Time given to basic subjects is almost thrown away. He recognizes that he lacks something the club or the short-cut course does not give. He lacks foundation, background. The term carcinoma gets no visual response; "sarcoma" creates a cerebral shudder that indicates its pathologic association; epithelium is merely a word and connective tissues but two words; they stir no associations. Cells, giant, spindle, round, are faded proofs made from sittings years old. They are only vague adumbrations or have entirely vanished. He realizes that the principle of the thing is wrong. The gathering is wrongly named. A listening club, a seeing club is not a study club.

Evidently, there must be a background for study if that study is to be worth the name or any man's time. At any cost, that foundation must be obtained. And it cannot be obtained by an hour-a-week method. Neither can it be obtained by means of rostrum didactics. The pulpit has never produced and educated man in the pew. The best judgments in education are agreed that the lecture method of instruction is practically valueless and that the best method is the one that makes the student study. The teacher of today is no longer a compendium for student convenience but a director to sources of knowledge and in the analysis of the same. If an aspirant to education lacks foundation but lives near a school, he may register, at small expense, as an unclassified student and acquire what he needs. If he lives at too great a distance from a school, he must none-the-less become a student and obtain a groundwork for study.

It is clear that a recent graduate is in the best position to maintain mental alertness and understanding, to keep up satisfyingly with the findings of the laboratory and clinic. It is doubtful that the man who sold his books at graduation or has kept them unopened through the years can, by a sudden resurrection of interest, get much from the scant gleanings of a lecture course. Whatever may be the virtues of the short course or the study club, it is evident that they present a powerful argument for the upkeeping of scholastic contacts through books and journals, from the day school drops into history, and through

the labor filled days of professional service. A man's intellectual avidity must be more precious than the cost required to maintain it. To say he is too busy to read or that he cannot for any reason is self-excommunication from the ranks of professionalism and a similar classification as a mere laborer.

THE TWO RELIEF FUNDS

There seems in the minds of certain of our members some confusion regarding the relief funds, and it is our hope at this time to correct any misapprehension, and, if possible, to make clear to all the precise status and purpose of these funds.

There are two funds, and this fact should be widely known. When, at the Cleveland meeting, President Buckley proposed a raise of dues, and stipulated that a certain part of this raise should go to relief, it was at once assumed by some that this was intended to do away with the previous plan of raising funds for relief by the sale of Christmas seals. Nothing was further from Dr. Buckley's thought. He used the argument that the interest alone on the endowment fund, which at that time had not reached $100,000, was wholly inadequate to take care of the cases that were urgently calling for relief, and that provision should be made by a raise of dues to take care of all the emergencies that were constantly arising. No statement has ever gone out from the Secretary's office that would lead anyone to infer that the money received from a raise of dues would take the place of the fund secured by the disposal of the seals.

As the magnitude of this problem of relief presented itself to the Association, the idea crystallized in the minds of those most familiar with it that the only feasible plan was to utilize the funds provided by the raise of dues for emergency work in the relief of urgent cases, leaving intact the endowment fund from the sale of seals till it had reached such proportions that the interest would furnish a sum that would, in a measure, be adequate to meet the situation. The fund has grown perceptibly each year, but it is by no means large enough to provide the necessary relief without invading the principal; and this is against the policy of the organization. When the time comes that the interest on the fund will care amply for all worthy cases, it is probable that the dues will no longer be used for this purpose.

We bespeak a hearty support on the part of our members when the seals are sent out each Christmas.

C. N. Johnson.

"WHAT IS RESEARCH?"*

UNIVERSITY OF MICHIGAN
Ann Arbor
College of Dental Surgery, Office of the Dean

January 12, 1925.

DR. OTTO U. KING,
5 N. Wabash Avenue,
Chicago, Illinois.

My dear Dr. King:

I am writing to say that I was very much pleased with the scope and the content of your last editorial in THE JOURNAL OF THE A. D. A., on research.

I hope that many of the pseudoresearch and pseudoscience men in this country, who are nothing more than technicians, will see your article and will profit by it in the directions indicated by your editorial. An occasional reference to this will be beneficial to some of those who have usurped the use of the term, research, to elevate themselves and it may stimulate some of the dental schools who have not made research a part of the regular program to change their attitude.

Again assuring you of my appreciation of this editorial, I am, with kind regards,

Cordially yours,

MARCUS L. WARD.

WHY DOES THE MEDICAL SCHOOL OF THE UNIVERSITY OF ILLINOIS TURN AWAY PRACTICALLY AS MANY STUDENTS AS IT ADMITS?

Taxpayers in rural districts that are suffering from occasional medical attention, or in many instances from having no resident doctors at all, are amazed at the news that the medical school of the University of Illinois is turning away more students than it admits. The need for doctors is great. The output of men to care for the public health is not keeping pace with the growth of the population. Practical, everyday general practitioners are becoming almost as scarce as the proverbial hen's teeth. Of men to perform infrequent and so-called skilled operations in handsome and luxurious hospitals, there are plenty and to spare. Any man or woman who needs an expensive laparotomy can find institutions by the score and clever men by the dozens to do this delicate work. But where, oh where are the practical general physicians to attend to the minor ills of general humanity? The man to lance a boil, to cure a case of constipation or any one of the hundreds of common mortal ailments, the healing of which day by day did so much in years gone by to make the family physician one of the helpful powers from end to end of the United States? . . . where is this man in hundreds of country districts today? The answer lies in the fact that the family doctor of former years is passing from the scene, and he is not being replaced by the current graduates from medical schools. Instead of viewing the medical school as a place in which to learn how to make sick people well, and to maintain a community in good health, the medical student of modern times is being taught to regard his college as a place of research and specialization, with the result that, away from this institution, he is helpless.—*Illinois Medical Journal,* October, 1924.

*Editorial, January issue, page 84.

Medical and Dental News

CALIFORNIA

No Thirteenth Floor: It is reported that, as a concession to the superstitious, there will be no thirteenth floor in the new fifteen-story medical and dental building in construction in San Francisco.

CONNECTICUT

New Haven Dental Clinics: The New Haven Department of Health maintains six school dental clinics in their sixty-four schools. During 1924, two dentists cared for the teeth of 6,977 children from the first, second and third grades of forty-one schools. These children had 7,019 teeth filled, and 6,181 extracted. Emergency cases were also given care. In eighteen schools, the children in the first five grades received care (7,562 children). Each child was given prophylactic treatment and instruction in mouth hygiene and the use of the toothbrush. Seven hundred and twenty-two class talks on care of the teeth, and 188 toothbrush drills were given. Dental hygienists referred 3,133 children to their own dentists for further treatment.

New Haven and Rickets: New Haven has finished the first year of its three year demonstration to show rickets is a preventable disease. The study, conducted by the federal children's bureau and Yale School of Medicine cooperating with various charitable, nursing and social organizations, emphasizes anew that administration of cod liver oil and exposure to direct sunlight are enemies of the disease (The Survey, Jan. 15, 1925). Mothers of new born babies are urged to bring their children, if possible before the end of the first month, for examination, including a roentgen ray, and monthly checkups thereafter. Advice as to treatment is given. Rickets has been found common, on a clinical diagnosis, in a control group of 454 children between 4 months and 5 years, 84 per cent of white children and 94 per cent of colored showing evidence of the disease. In the group of their baby brothers and sisters (234) born in the past year, who are still under observation and care, only 12 per cent showed clinical evidence of rickets; and including the babies who show roentgen ray evidence, which often precedes the clinical symptoms by several months, the rickety group included only 29 per cent. The rate is noticeably lower among the children of parents who were known to have followed instructions. "From the experience of the demonstration, confirming earlier studies, Dr. Martha M. Eliot, director of the hygiene division of the children's bureau concludes:

Rickets is a disease which begins insidiously in the very first months of infancy.

Rickets develops just as early in breast fed babies as in artificially fed babies.

Measures for the prevention of rickets must be undertaken before the time when roentgen ray evidences of rickets may first appear, that is, before the end of the first month.

The large majority of infants in the first months of life take cod liver oil without digestive disturbance.

All healthy infants can be given direct sunlight both in winter and in summer either out of doors or near an open window.

DISTRICT OF COLUMBIA

Army Graduation Exercises: The graduation exercises of the Army Medical, Veterinary and Dental schools were held, Tuesday afternoon, February 10, in the Red Cross House, The Army Medical Center, Washington. The graduates of the Dental School were Edward C. Alley (Dental Corps Medal), Avery G. Holmes (Honor Graduate), Daniel Bratton, Charles J. Benholm, Glover Johns, Walter D. Love, Edwin St. C. Wren.

GEORGIA

Cancer Control: Recently, cancer control work has been organized in Georgia. J. B. Donaldson, D.D.S., is to handle the work among dentists in the twelfth district, as district chairman.

ILLINOIS

Child Welfare Library in Chicago: The Elizabeth McCormick Memorial Fund, 848 North Dearborn Street, places its library at the free disposal of health, social and child welfare workers. The collection is the oldest of its kind in the country and is devoted entirely to child welfare and kindred subjects. The assistance of the trained librarian may be obtained for special study or research.—J. Home Economics, February, 1925.

INDIANA

Dental Law Passed: January 29, a bill was passed unanimously in the state senate against the operation of fake dental colleges and the sale of diplomas by so-called dental institutions. The measure provides that any person desiring to practice dentistry in Indiana must procure a certificate, through examination, from the state board of examiners. The applicant must submit to the board his diploma from a recognized dental college.

LOUISIANA

Tulane Dental Clinic: The dental clinic of Tulane School of Dentistry shows an increase in attendance for 1923-24, due, probably to improvement in service and the installation of new equipment. The number of patients treated from Oct. 1, 1923 to Sept. 30, 1924, was 12,579 as compared with 9,606 for 1922-1923 and 4,017 for 1921-1922.

Dr. Knapp Honored: Dr. J. Rollo Knapp, of New Orleans, was honored by a banquet, February 11, given by the dentists of that city, in celebration of his fifty years in professional service. Dr. Knapp has been the recipient of numerous degrees, medals and other honors, both in this country and in Europe. He has served as vice-president of the Southern Dental Association and as president of the Louisiana State Dental Society.

MAINE

Portland Opens Malnutrition Campaign: A campaign against malnutrition was opened at Portland, Dec. 1-3, 1924. There were fifty-eight students in attendance at the course of instruction in nutrition, representing all sections of Maine, New Hampshire, Massachusetts, New York, Maryland and Washington. All public health and school nurses of Portland and some public school principals enrolled. The work was under the auspices of the Woman's Literary Union with the departments of education and health and the service clubs cooperating. Special meetings were held by the medical and dental societies. Seven physicians volunteered their services in connection with these classes.—J.A.M.A., Jan. 3, 1925.

MASSACHUSETTS

Forsyth-Tufts Graduation: The tenth commencement of the Forsyth-Tufts Training School for Dental Hygienists was held, January 29. Twenty-two hygienists were graduated. Dr. Leroy M. S. Miner, dean of Harvard Dental School, gave an address "Service for Health."

MICHIGAN

First District Dental Society Meeting: At a meeting of the First District Dental Society, Detroit, in January, Dr. Henry Sage Dunning, of New York City, spoke on oral surgery, with special emphasis on exodontia. Preceding the meeting a clinic was given at Harper Hospital from 2 to 5 p. m., followed by a banquet at 6:15. An after dinner speaker, a member of the Western Audit Company, spoke on the business management of a dental practice.

MISSOURI

Clinic at Eldon: At a clinic held in Eldon recently, all the grade and high school pupils (693) were examined. The dentists report conditions much improved over three years ago, when the first clinic was held.

Physicians and Dentists Business Association: Dentists and physicians of Moberly have formed a business association to protect the business interests of members of the two professions.

NEW YORK

New Medical Center: Ground has been officially broken and actual construction begun on New York's new medical center, which is being developed under the direction of the joint administrative board of Columbia University and Presbyterian Hospital. At the exercises held Saturday, January 31, on the twenty-two acre plot at One Hundred and Sixty-Eighth Street and Broadway before a notable gathering of representative persons of the metropolitan district, including many of the profession, Mr. Edward S. Harkness, the first chairman of the joint administrative board, turned the initial spade of earth. This act signalled the starting of the construction of the first and largest unit of the Center, the combined new Columbia University School of Medicine and Presbyterian—a ten million dollar structure.—Boston M. & S. J., Feb. 12, 1925.

PENNSYLVANIA

Work of Clinic Extended: The clinic established one year ago by the Lebanon County Health Organization has been taken over as a part of the regular school system. Dr. J. G. Hollister, of the state dental department, conferred with the County Health Organization recently in regard to extending the work to rural districts.

Dental Society 30 Years Old: The thirtieth anniversary of the Dental Society of Chester and Delaware Counties was held, January 28, at the New Century Club, West Chester, thirty-five members attending. In the afternoon, the annual meeting and election of officers was held, and in the evening a banquet was served. The following officers were elected: president, Franklin Bernard, Kennett Square; vice-president, Thomas W. Lumis, West Chester; secretary, P. C. Hollis Lapp, Malvern; treasurer, D. C. Turkington, Chester; executive committee: J. F. Chermol, Chester; Trevor Wright, Coatesville; J. W. Godard, Ardmore.

Meeting of the Odontological Society: A meeting was held at the William Penn Hotel, Pittsburgh, Dec. 15, 1924. The election of officers resulted as follows: president, P. V. McParland; vice-president, A. C. Barclay; secretary, Leslie Waddill; assistant secretary, S. S. Haudenshield; treasurer, C. R. Garman; editor, W. F. Swanson; Business manager of the Bulletin, Leslie Waddill.

TENNESSEE

Dental License Law Upheld: The state law granting the right of the Tennessee Board of Dental Examiners to revoke dentists' licenses for unprofessional conduct was upheld in an opinion handed down in the chancery court, Nashville, January 21. It was charged that a dentist used his name and license in maintaining an office in which he did no practicing, but had other dentists to do all the work under his name. The board of examiners therefore revoked his license, and the dentist in question sought to have the injunction against him dissolved.

FOREIGN

Teeth of Vienna School Children: In his annual report on the school children of Vienna, the chief medical inspector appointed by the board of education speaks very strongly, both as to the amount of dental caries and as to the absolute indifference shown by the parents when their attention is drawn to it. Most of them think it is hereditary—they, themselves, have had bad teeth, and their children also must suffer. Of 8,756 girls examined, only 1984 had satisfactory teeth, and the same proportion was found in boys. "Satisfactory" means only that there was no caries, but does not mean that the teeth were complete. The lack of interest taken in cleanliness and preservation of teeth is all the more regrettable when it is stated that half of the children leave school suffering from dental caries, yet their condition is such that their teeth could be saved at very little expense.—Vienna Letter, Boston, M. & S. J., Jan. 15, 1925.

"Dental Nurses" or "Dental Dressers" Controversy: In regard to the present controversy, a question which had more than once been commented upon in the previous issues, it should be judicious and perhaps helpful to take into consideration the professional opinion formed in other countries where "dental nurses" have for some time been employed. Although the Principal Dental Officer of the Education Department of Victoria has strongly advocated the instituting of the New Zealand system—said to be an "unqualified success"—of state-trained nurses for the dental treatment of school children, the Dental Society of Victoria and the Federal Council of the National Dental Association of Australia have carried motions opposing any scheme which permits dental practice by partially trained men or women. The following extracts from an editorial article in the Australian Journal of Dentistry may fairly be taken as representing the views and feeling of dentists practicing in Australia: "We hear that already one or two have applied for registration in another state. We have had attacks on our Act by unrecorded and recorded practitioners, and it would be indeed foolish for us to permit another section of unqualified persons to be nurtured with our state, to be a menace to our professional comfort, and a potential source of 'poor dental work' for the public . . . . Children's work requires just as much skill and knowledge as other branches of practice, and while undoubtedly women are eminently suitable for this class of work, the full curriculum should be demanded. Anything less is unfair to the public, and will decidedly lower the status of dentistry in the eyes of the public." The article furthermore dismisses the argument that

there may not be sufficient practitioners available to do the work that presents, for "at the present there are many young dentists looking for work." It seems evident that the dental profession in Australia is passing through a phase of misconception and confused logic, the difficulties and dangers of which we in this country, it is to be hoped, have now clearly seen and definitely surmounted. In both countries, the trouble has been mainly due to the fact that certain "higher" authorities and administrators for a time succeeded in engendering in themselves and others a belief that there did exist a grave "shortage" of practitioners. Yet the belief was at the bottom unsound, because it overlooked or waived recognition of the vital distinction between a real need (or perhaps, in the patient's view, a mere desideratum) and an active desire and effective demand. In all "civilized" countries, it is this reasonable "effective" demand that determines, in the case of nearly every kind of service offered—including medical services, whether a transference does or does not take place. Voluntary or charitable service is of course in another category, and the amount or proportion given or accepted is in each case entirely a matter for individual choice and decision. Dentists should stand united and firm on the solid ground of experience, and in the honest and outspoken conviction that there cannot, by any means whatsoever, be called into existence any such thing or "service" as cheap dentistry. For they know and should proclaim the fact that, with the best will in the world, any large scale attempts in that direction will only result in disservice; a "cheap" and overdriven dentistry being—like "cheap" medical or surgical treatment—a bad and, either instantly or in the long run, a costly business for the community.—Dental Rec., December, 1924.

GENERAL

Health Education and Publicity: The American Journal of Public Health is a pioneer in establishing a department devoted to this subject, and has placed in charge Evart G. Routzahn, associate director of the department of surveys and exhibits, Russell Sage Foundation.—J. Home Economics, February, 1925.

Study of Pyorrhea: The University of California has received a fund of $105,000 to be spent in an investigation of pyorrhea and its relation to other maladies. Research workers from various fields of science will cooperate in the investigation. The Carnegie Corporation contributed $85,000 to the fund.—Hygeia, February, 1925.

Health Posters: The National League for Health, Maternity and Child Welfare has published as a leaflet and poster the following:

How Mrs. John Bull Rears An A-1 Family

1. She attends an antenatal clinic before each child is born.
2. Her first baby was born in a maternity home, as Mr. and Mrs. Bull could not get a house, and were living in lodgings. The others were born at home, with a certificated midwife to attend the confinement, and a home-help to look after the house and the children.
3. She takes the younger children to the infant welfare center at least once a fortnight and learns all the mothercraft she can.
4. She breast-feeds her babies regularly by the clock during the day and gives no night-feeds.
5. Each child after weaning has a pint of milk daily and no tea, but plenty of water to drink.
6. She keeps all food protected from flies.
7. She cooks simple, wholesome meals tastily, with plenty of fresh fruit and vegetables.
8. She has her own teeth and those of her children attended to regularly.
9. She has simple furniture and little of it, and keeps everything scrupulously clean and tidy.
10. All the family have frequent baths; the baby a daily one.
11. The baby has its own cot, and sleeps out-of-doors nearly all day.
12. All the children are in bed by 7 p. m.
13. All windows are always open day and night.
14. All the family take plenty of exercise.
15. John Bull lightens his wife's tasks in every way he can.

Dental Reciprocity: In the United States of America the following conditions exist in regard to the practice of the reciprocity feature incorporated in some dental laws. About twenty distinct reciprocity clauses have been enacted in as many dental laws. Arizona, Georgia, Maryland, Mississippi, New Mexico, South Carolina, Virginia and Washington have incorporated reciprocity provisions in their dental law. Provisos in other dental laws may be construed as permitting interchange of dental licenses under special conditions, namely: California, 1915-1921 Dental Law, Louisiana, New York, Oregon, Pennsylvania and Porto Rico. Twenty boards of dental examiners are more or less favorable to extending opportunity to the reciprocity candidate to undergo the practical examination for a license to practice dentistry, while six more states may be said to have nominal reciprocal relations with other states, thus making about twenty-six states which may or may not exercise the privilege; or the total number of boards of dental examiners which by a liberal interpretation may interchange dental licenses, quoting the language of

the law, according to the "discretion of the board of dental examiners," is about thirty-four. The number of boards which actually interchange dental licenses is twelve. Twenty dental laws fail to provide for reciprocity by any specific reference to it, and fifteen states do not want to extend reciprocal relations in any form. The interchange of dental license upon any condition has always been consistently and constantly opposed by six states. Reciprocity conditions are further complicated by the fact that eight influential states have recently cancelled their reciprocity agreement; thus, by leaving out doubtful commonwealths, reducing the number of states which may interchange, to thirty, ten of which again may, but do not, leaves about twenty state boards which more or less openly favor reciprocity at this time. This situation may change within a year, such is the uncertainty created by legislative unrest, litigation and court verdicts. A reaction may set in and the outlook for dental reciprocity may reach a more favorable aspect. Summed up in a few words, reciprocity has gained in six states of the South and six states in the West, but lost in the West eight, while there are eight doubtful boards in the West. In the middle and eastern states there is no change.—Alphonso Irwin, in Dent. Summary, February, 1925.

Christian Science: A layman expressed his opinion of Christian Science in one of the Indiana newspapers by saying that "'Science and Health, with a Key to the Scriptures' is an aggregation of effrontery, inconsistency and falsehoods." As any unfavorable comment concerning Christian Science, even in a medical journal, brings forth a retort by the Christian Science Committee on Publication, the one mentioned brought forth the usual statement that "Christian Science heals all manner of disease by regenerating the sinner and is, in an ever increasing measure, overcoming the power of death." Christian Science never has proved anything in the way of curing serious or malignant diseases but has many unnecessary deaths from negligence and ignorance charged up to it. If there were more laymen who had the nerve to express publicly the opinion which we have quoted and there were more courts that would take cognizance of the facts, there would be fewer children and adults dying from diphtheria and other curable diseases when subjected to Christian Science treatment as the only relief.—J. Indiana State M. A., January, 1925.

Naval Dental Corps: Lieutenant Commander Albert Knox has been ordered detached from the hospital ship Relief and assigned to duty at the Naval Medical School, Washington. Lieutenant Hugh E. Mauldin has been transferred from duty at the Washington navy yard to duty at naval training station, Hampton Roads, Va. Recent orders detaching Lieutenant Charles O. Sandstrom from duty with the marine detachment, American legation, Managua, Nicaragua, have been revoked, and he will continue on his present duty. Orders transferring Lieutenant Philip H. MacInnis from duty at the navy yard, Portsmouth, N. H., to duty on board the U. S. S. Rochester have been modified, and instead he will go to duty at the New York navy yard. Papers of the candidates recently examined for appointment to the dental corps of the Navy still are in the hands of the examining board, but it is understood that five candidates were found qualified for appointment to fill the vacancies existing under the present allowed strength of that corps.—Army and Navy Register, Jan. 31, 1925.

Army Dental Corps: The following from duty at Army dental school, Washington, and from temporary duty at medical field service school, Carlisle Barracks, Pa., about June 5 to duty at stations indicated: Capts. Edward C. Alley, Washington Barracks, D. C.; Glover Johns, Army and Navy General Hospital, Hot Springs, Ark.; Daniel Bratton, Fort Brown, Tex.; Edwin S. Wren, Scott Field, Ill., and Charles J. Denholm, Fort Benning, Ga.—Army and Navy Register, Jan. 31, 1925.

DEATHS

Beatty, J. Edgar, Wilkinsburg, Pa.; Fennsylvania College of Dental Surgery, 1896; died, January 24; aged 50.

Brown, James D., Los Angeles, Calif.; a practicing dentist in Fort Wayne, Ind., for over fifty years, died recently, aged 90. Dr. Brown retired from the practice of dentistry in 1900.

Glass, Percy R., Saginaw, Mich.; University of Michigan College of Dental Surgery, 1898; president-elect of Michigan State Dental Society; was instantly killed, December 27, when his automobile skidded and crashed into a pole. Dr. Glass was 46 years old.

CURRENT LITERATURE

EXTRACTS AND ABSTRACTS

Dental Hygiene for the Child: C. N. Johnson (Am. J. Pub. Health, February, 1925) stresses the importance of dental hygiene for the child as promising most for the prevention or the postponing of dental caries. Care of the teeth rests with the individual rather than with physician or dentist. The latter must be the teacher. He must emphasize the daily care of the teeth rather than the occasional visit to the dentist. However, the minute decay sets in, the dentist's services become imperative. It has been said that one must commence with the grandparents to insure sound teeth. True as this may be, it is impossible with the present generation so the best possible must be done with the material at our command. And this is not such a hopeless task since the environment of the tooth is more important than the tooth structure. When children are taught mouth hygiene and give their teeth proper care from an early age, the tendency to decay may be largely overcome, and with each generation the time of tooth decay may be put off to a later and still later period. Care of the deciduous teeth and particularly care of the first permanent molar should be taught all who have the care and oversight of children. The economic factor of tooth care looms large when it is realized that the cost of educating "repeaters" is in New York City alone $1,000,000 yearly. Eighty per cent of failures are due to physical handicaps and most of these are connected with oral conditions. If one-half the sum were expended in prevention, much suffering would be avoided and the wastefulness would be stopped at its source. Another important consideration is dental deformities. These must be corrected to obviate faulty occlusion, which means impairment of function through inadequate mastication, and to overcome facial deformity. Society demands so much today; certainly no child should be allowed to grow up with the handicap of a correctible physical defect.

Treatment of Children: One finds very few children whose mouths are quite free from caries, and in considering the advisability of removing decayed teeth, in the interest of the child's health, I practice and advise the removal of all carious temporary teeth where the pulps are exposed, or where they are dead and putrescent. An exposed pulp is necessarily an infected one, hence it is better to remove the tooth. Temporary teeth which are carious, but with no involvement of the pulp, it is advisable to fill, and this may be done with copper amalgam or copper cement—this latter being almost ideal for the purpose. If a cavity is at all deep, it is wise, as a precautionary measure, to line it with a mixture of zinc oxide and oil of cloves, as, unless the vitality of the pulp can, with reasonable certainty, be preserved, it is better to extract the tooth. Cavities which are very shallow or of the erosion type, are best treated with silver nitrate; I use a 50 per cent solution in distilled water. It is, of course, imperative, wherever possible, to save the temporary molars until after the eruption of the first permanent molars at the same time, I consider that if the temporary molars are badly decayed and have exposed or dead pulps, in the interests of the child's health, from a clean mouth point of view, it is better to extract, as the lesser of two evils.—W. T. Hyder, in Dental Sc. J. Australia, Dec. 1, 1924.

Treatment of Tic Douloureux: In an article on the use of procain and alcohol in the treatment of the tic douloureux, P. J. Aufderheide (Dental Summary, December, 1924) reaches the following conclusions: 1. Peripheral alcohol injections are more successful than deep alcohol injections, and afford a much simpler technic, eliminating complications. 2. Peripheral alcohol injections should be resorted to before any intracranial operation is advised, although in a skilled surgeon's hand the operation is

much simpler than is generally thought. 3. Use of procain previous to alcohol injection is very important. 4. Diagnosis is paramount and must be correct if results are to be obtained. 5. Many more cases are caused by the long buccal nerve and sometimes by the lingual than is realized.

Oral Sepsis and General Health: There are few practitioners, medical or dental, who do not appreciate the malign influence of oral sepsis on the general health. Many of the so-called degenerative diseases of later life are due to neglect to remedy pathological dental conditions during childhood. Colyer proves conclusively the liability of the cranial sinuses, tonsils, the entire alimentary tract, and associated organs to infection from oral sepsis. Anemia, kidney disorders, cardiac diseases and iritis are frequently traceable to septic conditions of the teeth. Wilcox traced seventy-two cases of "rheumatism" out of 100 consecutive cases at St. Mary's Hospital to dental infections. The entrance of streptococcal toxins and bacteria into the circulation at a dental focus, and their deposition in remote tissues, levies a heavy toll on the national health. From the foregoing it will be apparent that oral sepsis is a most important factor in the ever-increasing tax upon hospital accommodation. Practically all applicants for outdoor and indoor free hospital treatment exhibit some form of oral sepsis. Where this condition is not directly responsible for the illness for which they seek relief, it is certainly an obstacle to their recovery. "Suspect oral sepsis" should be a maxim for every medical diagnostician. "Eradicate oral sepsis" is a duty-call to every dental practitioner.—Australian J. Dentistry, Nov. 1, 1924.

Surgical Removal of Teeth, Under Block Anesthesia: According to A. M. Nodine (Brit. Dent. J., Jan. 15, 1925) extraction of teeth by instruments, though practiced for thousands of years, (1) fails to remove all of the tooth in from 20 to 45 per cent of cases; (2) often fails to remove infection; (3) in apical infections and pyorrhea, stirs up the infection and opens new channels for absorption; (4) is inadequate in many cases of unerupted or impacted teeth; (5) does little or nothing to prepare the arch for an artificial appliance; (6) sometimes results in fracture and removal of the bone about sound adjoining teeth; (7) in impacted teeth, the alveolar bone is frequently fractured and the tissues torn, and so rendered liable to infection; and (8) in impacted cases, adjoining teeth are loosened or removed and sometimes the jaw is fractured. Practically all of these contingencies can be guarded against. The surgical removal of a tooth varies according to the position and condition, but the general principles to be followed are those employed by a general surgeon in removing a foreign body embedded in and covered by bone and soft tissue. Suitable incisions are made in the soft tissues, which are elevated from the bone, and sufficient covering bone is removed to enable one to see, to release and then to lift out the foreign body. The cavity is then explored, and any diseased tissue is removed. The wound is cleansed, the overlying tissues are removed or replaced and secured in place, and the wound is closed completely or drainage is provided for, as the case may require. The author uses block and infiltration anesthesia with procain and epinephrin except in simple operations in children, when ethyl-chlorid is used. No other anesthesia has been found so safe, certain and free from bad after-effects. Anesthesia can be obtained in from five to fifteen minutes, and lasts from one-half to one and one-half hours, and the surgical methods described are advocated only with this form of anesthesia. Although there are the disadvantages of length of time required for the operation; there is the jar of the malleting; it is sometimes difficult to convince the patient of the merits of the procedure; and assistance is required, with proper illumination and proper equipment and a knowledge of anatomy, yet the method has the advantage of obviating all the undesirable features and untoward results of the older method of pulling, crushing and fracturing teeth out of the jaw.

Dental Caries: To the average medical man, a bad tooth is a bad tooth. He does not have to distinguish between the teeth with soft or discolored areas of hypoplasia, the teeth worn down by attrition or abrasion, the chemically eroded teeth and those truly carious. Although he can and does hand over this problem to the dentist, it is of no little value to compare notes occasionally and see what has been accomplished. The enamel of the teeth is shown by histologic study to be composed of enamel rods joined by a cement substance. This cement is somewhat soluble in acid and when dissolved the enamel rods become loosened

and a cavity forms. Once through the enamel, much more rapid destruction occurs and bacteria invade the dentin, growing in the dentin tubules and destroying the matrix by decalcification and subsequent putrefaction. Unless there is operative intervention, infection of the pulp soon follows. There is no one organism which can be blamed for dental caries. The commonest seems to be Bacillus acidophilus, so frequently administered in intestinal disorders, or a related form. It is able to produce and resist a high concentration of acid on the tooth surface, although its presence in perfectly healthy mouths means other factors must come into play. As is to be expected, the ductless glands have come in for a share of blame, although the only definite evidence is slight deficiency in calcification after parathyroidectomy and some clinical observations of rapid tooth decay in cases of hyperthyroidism. The buffer action of the saliva is apparently of importance in neutralizing the acids produced by the various bacteria. Several sets of experiments show that this buffer action or neutralizing power may increase considerably when saliva is obtained by stimulation of the salivary glands, found to be much less in cases with caries than in those with sound teeth. McCollum and his coworkers have succeeded in producing caries-like lesions, pulp exposure, fracture and overgrowth of the teeth by various dietary changes. Although the evidences of the disease are entirely out of proportion to the extent of any food deficiency and it is not possible to blame dental disease on any one specific dietary deficiency, they seem justified in their conclusion that "any slight variation in the American diet, which always so dangerously approaches the level of dietary deficiency, might become active at any period of lowered resistance or of physical or nervous stress."—Boston M. & S. J., Dec. 11, 1924.

Ethylene: L. F. Sise (Boston M. & S. J., Feb. 12, 1925) gives the history of the use of ethylene anesthesia, and discusses its physical and physiologic properties. Under "Clinical Results" he states that if ethylene stands between ether and nitrous oxid, as has been said, it is nearer nitrous oxid. It is not so safe as ether as regards overdosage. As compared with nitrous oxid, its unpleasant odor and its inflammability are to be considered. Except for these, it has all the good qualities of nitrous oxid and is a better relaxant. The author says: "Among a considerable number of clinical observers, there is very general agreement on the following points: Ethylene may be used with more oxygen than is possible with nitrous oxid. There is better relaxation, though not so good as with ether. There is much less sweating than with either nitrous oxid or ether; there are fewer gas pains; and the general postoperative condition of the patient is better. It has no irritative or other harmful effects on the lungs, kidneys or liver. Most of these observers agree that ethylene is preeminently an anesthetic for bad risks. This is one of its outstanding features. There is some disagreement about the amount of vomiting. Unquestionably, this varies with the purity of the gas. The first gas which was put out commercially produced more vomiting than either nitrous oxid or ether. The present gas produces much less than ether, and probably not far from the same amount as nitrous oxid,—sometimes more and sometimes less, depending on the particular lot of ethylene. If the gas is really pure and is given without anoxemia, it seems probable that the vomiting will be less than with nitrous oxid." Its field of usefulness is large, no absolute contraindications to its use having been found except the presence of sources of ignition. It has been used successfully in all types of general surgery, in the otherwise healthy, and in cachectic infants and in the aged showing pulmonary, cardiac, vascular and renal pathologic conditions. It appears to be better than nitrous oxid in exodontia and has been very favorably reported on in obstetrics. The field of its greatest usefulness, and in which it has no peer, is in operations on "bad risks." The author closes with a detailed description of the technic and an extended discussion of the precautions to be taken because of the inflammability of ethylene, its one serious drawback.

Chlorin Treatment for Colds: Much has been said in the newspapers during the past year concerning the chlorin treatment for colds. It will be remembered that the method was first brought out by Drs. Vedder and Sawyer of the chemical warfare service of the United States Army. It was given a trial quite promptly by high officials of our government, including the President, and newspaper interviews brought it conspicuously to the attention of the public. In the meantime, the devices for administering chlorin have been gradually im-

proved and have been investigated by individual physicians and by public health officials throughout the country. One of the first official reports to be made available is that of the department of health of New York City, which conducted a clinic for several months under the direction of Dr. L. I. Harris of its bureau of communicable diseases. As has been stated in the newspapers, the results of Dr. Harris' investigations were not such as to hold forth any great promise that the method has any real virtues. On the other hand, Dr. Vedder and several other physicians who have conducted investigations are inclined to believe that the method has in reality considerable virtue. The experiments as conducted in New York City were criticized by those favoring the method on the grounds of inadequate apparatus, and on the fact that they were conducted during the two hottest months of the year. In any event, the public should know that the chlorin treatment for colds is best classified at the present time as an experimental method. In many cases, it seems to yield relief, whereas in others the results do not appear to be at all satisfactory. Before any method is adopted by medical science as a routine and as an established method, it must be demonstrated on a large scale that it has real virtue in a considerable percentage of cases; in fact, that it produces benefit to a greater degree than the methods previously used. No doubt, within the near future those facts will become available concerning the chlorin treatment of colds and other infections affecting the breathing tracts.—Hygeia, January, 1925.

Dental Diagnosis in Relation to Systemic Disease: The following diagnostic methods are listed by J. V. Hall Best (Dental Sc. J., Australia, Dec. 1, 1924): 1. Careful oral examination. 2. Use of study models. 3. Roentgenographic examination. 4. Bacteriologic tests. Differential blood counts have not been employed with any success, nor have complement fixation tests. The researches on blood chemistry as a diagnostic means of determining focal infection should be of great value if the theories are substantiated. In determining the diagnosis or prognosis of dental focal infection, the following factors must be considered: 1. Age of patient. 2. Patient's vitality. 3. Strategical importance of the teeth in question. 4. Patient's economic and social standing. 5. Patient's nervous system and probable psychologic reaction to different forms of treatment. The dental lesions capable of inaugurating systemic disturbances are: 1. Impactions and pulp nodules. 2. Parietal lesions (the pyorrhea cycle). 3. Periapical lesions (root-end infection). These three groups produce: (1) the reflex nervous condition; (2) infections of the alimentary canal; (3) lymphatic infections; (4) hematogenous or metastatic infections. There is clinical evidence to show that the pressure irritation from impacted or unerupted teeth may cause certain forms of insanity (melancholia, hysteria, etc.), as well as various forms of neuralgia. Reflex ophthalmic and aural disturbances of this character are not uncommon. Parietal lesions are less harmful to the system than periapical infection, the former being characterized by free drainage, which allows the excretions to be swallowed rather than to enter the blood stream. In periapical lesions, there are two types of infection, the purulent and the nonpurulent, the latter being more important in the production of secondary disease, since it produces only a mild inflammatory reaction, in consequence stimulating the defensive mechanism of blood phagocytosis in only a very small degree. In addition, as there is external drainage, the exudates must be absorbed by the lymphatic and blood channels, and bone has only a limited power of recuperation, unless a sequestrum is formed, which does not usually happen in root-end infections. The diseases produced by focal infection are: 1. Nervous and mental disorders. 2. Diseases of special organs (eye, ear, etc.). 3. Neuralgia. 4. Leunitis. 5. Myositis. 6. Arthritis. 7. Gastro-intestinal diseases. 8. Kidney diseases. 9. Blood diseases. 10. Bone infections. 11. Heart lesions.

Fatigue, Healthy and Unhealthy: The symptoms of fatigue are as varied as pebbles on a beach; yet the only type we recognize as such is the feeling we describe as "dog tired." This, however, generally comes from muscular exertion. It is the sort experienced by the manual laborer, the farmer and the athlete, and attacks the rest of us when we have used muscles that are unaccustomed to exercise. The simple remedy for it is physical rest until the poisons that have accumulated in the body are washed out and energy returns. Mental fatigue on the other hand, is the commonest malady of our day. It is probably caused by the congestion of the blood vessels at the base of the brain, and is the re-

sult of over concentration, worry or other mental strain. The type of rest which best drives it out is physical exercise, so that the blood may be forced from the brain into other parts of the body.—Helena Lorenz Williams, in Dental Summary, December, 1924.

Cod Liver Oil in Diet: If the infant cannot live for a part of the day in the sunlight, cod liver oil should always be added to the diet. Since the potency against rickets of cod liver oil is not known, it is a difficult matter to decide upon a fixed dosage. The careful work of Dr. Martin Eliot, and Dr. Edith Jackson, of New Haven, indicates that fairly large doses of cod liver oil should be given, if rickets is to be prevented. By the end of the month the infant should receive from one to one and a half teaspoonfuls of cod liver oil daily and by the end of the second month two or three teaspoonfuls daily. In the summer time, the dosage of cod liver oil may be diminished or omitted altogether. Sunlight stops rickets; it is probably a more potent antirachitic agent than cod liver oil. Cod liver oil, however, certainly exerts a curative influence even in the case of the premature infant, as is evident in radiographs, and should be given in large doses. If the infant is given the cod liver oil at an early enough age, he will like it, and the administration will offer no difficulty if the taste of the infant has been wooed from the beginning. The effect of cod liver oil in rickets or tetany is greatly diminished during the periods of infection. This is a fact not appreciated.—E. A. Parks, in Boston M. & S. J., Jan. 15, 1925.

Inflammation: Inflammation, which is responsible for a great majority of disturbances in the human body, dental disease, as well as other pathologic processes in other parts of the body (Bayford Underwood, in Dent. Surgeon, January 24, 1925) has been defined as the reaction of tissue to the irritant effect of an injury: mechanical, thermal, chemical or bacterial. The reaction varies only in detail; with the severity of the injury; and in accordance with variations in tissue structure. The blood and blood vessels are chiefly affected, the rate being first accelerated, but, on continued irritation, retarded, until the stage of stasis is reached. With retardation, there is clumping of corpuscles, which further impedes the circulation. Clearly, all stages of inflammation are attended with increase of blood in the tissues. The stage following stasis is exudation, the blood passing from the blood stream into the surrounding tissue (diapedesis). Mild inflammation terminates by resolution, the process being checked before the tissues are seriously damaged. If the initiation is more severe, suppuration may occur. This is generally the result of bacterial infection. If the period of stasis lasts beyond a certain time, the tissues cannot be restored to normal vitality, and so die. Small portions are cast off as sloughs. The death of large areas is called gangrene. The pus, a combination of invading micro-organisms and fluid exudate from the blood vessels, may be collected in a cavity or may be spread through the tissues (cellulitis). If the pus is collected in a natural cavity (pericardium, maxillary sinus), the condition is called empyema. When the cavity is formed in the tissues by the pus itself, an abscess is the result. The five so-called cardinal signs of inflammation are: heat, redness, swelling, pain and impairment of function. Treatment varies according to the position of the lesion and the type of tissue affected. First, the source of irritation should, if possible, be removed. For example, if a patient has an acute suppurative inflammation of the periodontal membrane due to bacterial infection which has progressed to an abscess, the tooth should be extracted. Sometimes, valuable time is lost in lancing the abscess. When the initial cause has been removed, the tissues can be assisted to return to the normal by counter-irritation, by which the red corpuscles are drawn away from the area of irritation, already clogged by the invading organisms and the white corpuscles. The final step in the treatment is to guard against further infection. In the mouth, this is accomplished by the use of mouth washes.

Treatment of Pulpless Teeth—Fees: A very good test of the mental attitude of the patient can be made before the commencement of treatment of a pulpless tooth, by explaining that a radiograph will be necessary to confirm the clinical diagnosis. Many teeth, on examination, are at once seen to be "hopeless," but the doubtful cases require radiography to determine the exact condition of the root and surrounding tissues. A patient who will refuse to pay the fee for a preliminary radiograph will never be persuaded to remunerate the dentist sufficiently to enable him adequately to treat that pulpless tooth. Of course, it

is quite possible that such a patient may visit a dentist whose fees are more suited to the ideas of the patient, and it may happen that the cheaper dentist's work is quite successful. This state of affairs is quite on a par with the constant cures by herbalists where the qualified physicians have failed. However, my remarks are not addressed to those misguided members of our profession who are afraid to lose a patient. These men work on the principle of Henry Ford, who turns motor cars out in great numbers, which are all built down to a price. Dentists should work up to a "Rolls Royce" standard. Cheap motor cars are a public utility, but cheap dentistry is detrimental to the public health. Emerson's saying, "Hitch your wagon to a star," is very applicable to dentistry. The best we dentists can do is only patchwork, so that the lowering of the standard of dental work is most reprehensible.—Cecil Pincus, in Australian J. Dentistry, November, 1924.

Diagnosis of Cancer: The keynote of the modern diagnosis of neoplasms, according to James Ewing (J.A.M.A., Jan. 3, 1925) is the recognition of many distinct clinical and pathologic entities in the vast field of benign and malignant tumors. The pathologist must have a well-equipped laboratory, and his findings there must be supplemented with an acquaintance with the clinical aspects of the disease. Laboratory and clinic must cooperate. Handicaps to correct laboratory diagnosis are inexpert technic in the preparation of microscopic sections, due to haste or inexperience of technicians; and inadequate clinical data. Gross examination in breast neoplasms has proved much more satisfactory than examination of the frozen section, which can be applied only to those portions of tissue selected as suspicious. The gross characters of malignant tumors are extremely varied, but as a rule tumor tissue and structures infiltrated by tumor cells present features easily recognizable by sight and touch. The pathologist should be thoroughly familiar with the data revealed by the roentgenogram, and should become expert in their interpretation. Most bone tumors can be classified by means of roentgenograms and clinical signs. Biopsy is of great importance to diagnosis, but should be practiced with great caution. The removal of a small, carefully selected portion of an accessible tumor seldom results in harm. Different types of neoplasms respond variously to radiation, and it seems probable that the data collected regarding this matter may form an important body of diagnostic criteria that will replace many operative procedures. In the interpretation of microscopic structure, the pathologist must have a knowledge of the doctrine of precancerous lesions, of their variable morphology and of the dangers of prophesying too freely about their outcome. A knowledge of these various phases of diagnosis will aid in determining, in addition, the stage of the disease and its prognosis.

Periodontal Pathology: Let us first seek out the salient points made by Box in this paper on periodontal pathology. Following a description of the periodontal tissues and of the various types of gingivitis, he has given us a new and known fact that when teeth become loose and are exfoliated, it is the result of a disease process whose principal feature is the dissolution of the pericementum and bone, with pocket formation. Box has described this type of periodontal disease in detail, and has analyzed the steps leading to the formation of the pocket. In doing this, he has chosen to delimit certain phases or stages in this pathologic progression, each of which has characteristics distinguishing it from the others. Taking the progression as a whole, he calls it chronic periodontitis, a term which thus covers what has so long been called pyorrhea alveolaris. He then subdivides it into two similar and yet dissimilar disease conditions. These he calls chronic periodontitis simplex and chronic periodontitis complex. Each of these is divided into sequential phases. In essence, the chief difference between these two conditions lies in the fact that the first phase in chronic periodontitis complex is rarefying pericementitis fibrosa, a new disease which Dr. Box has discovered, and which does not occur in chronic periodontitis simplex. Since the complex type of periodontitis is far more common and destructive than the simplex type, rarefying pericementitis fibrosa assumes a position of great significance. Its discovery is so important that it unquestionably places Box's name along with the name of Miller in the gallery of dentistry's immortals. Like Miller, he has discovered the initial lesion in a disease process which is as destructive to the human dentition as caries. Like the work of Miller, his work points the way clearly to the final solution of one of dentistry's big problems. And it does this by at once stating what the beginning of the scourge

of periodontal disease is, and at the same time disposing for all time of the false theories that have confused us.—J. O. McCall, in Oral Health, January, 1925.

Deep Roentgen-Ray Therapy: Newcomer, Newcomber and Conyers report a case of epithelioma of the cheek (J. Radiol., January, 1925) in a man, aged 63, which started as a large pimple six months before. The growth had been removed surgically nine days before, and while the wound healed, the scar became indurated and a gland could be felt under the left jaw. The pathologist reported epithelioma with projections extending to the edge of the growth. The patient was given a full erythema dose over the entire left side of the face and neck, and six weeks later the treatment was repeated. When last seen, there was no induration or trace of the previous trouble. A case of carcinoma of the lip, in a man, aged 40, developed from an injury to the mouth two years before. A growth on the right side of the lower lip began to discharge serum, heal over and break down again. The growth was burned out, but when the authors saw the patient, it had extended a little past the middle line of the right side of the lip. It had been present seven weeks, and there were some palpable glands beneath the jaw in the middle line. A full erythema dose was given over the right side of the face and neck, with an additional dose over the chin and lip in the middle line. The dose was repeated in six weeks. When last seen, there was no trace of growth in lip or jaw, and no enlarged glands.

The School Dentist: A school dentist must act as a buffer or pacifier between dentists and hundreds of children who have been scared out, or treated so roughly by their own dentists, as they say, that they positively refuse to go back to them. He can alleviate those cases, treat them and return them to their own dentists very nicely, provided he uses tact in doing so. He must give both pupil and dentist a square deal in this matter. It is simply folly to carry on the dental clinic work without the educational part in the schools. And no one else can do the work so successfully in the schools as the school dentist, for he alone knows the true condition of the mouths. And his presence there inspires confidence and faith in him so that the children are willing and anxious to come to the clinic, where they positively refuse to go to a strange dentist. And once the start is made they can easily be persuaded to go to their own dentist. This alone is a very important part of our work.—G. G. Garrison, in Oral Hygiene, February, 1925.

Neoplasms and Bad Teeth: Too much stress cannot be laid on the factors of bad teeth, tobacco and syphilis in the production of cancer. I am unable to recall a single patient with an intra-oral carcinoma in which one or more of these factors was not present. Certainly, in the treatment of these neoplasms the oral cavity must be made as aseptic as possible previous to radium treatment.—G. A. Robinson, in J.A.M.A., Jan. 24, 1925.

Surgery of Cancer: Cancer occurring in different areas of the body seems to have special characteristics. Cancer occurs frequently about the head, face and neck, developing from the mucous membrane of the buccal cavity or from the epithelium of the face. Three and seven-tenths per cent of the deaths from cancer occur in those in whom the cancer originated in this region. The characteristic thing about cancers in this locality is that they almost always remain local, in spite of the very rich lymphatic drainage of the tissues of the head, face and neck, and the ease with which cells might be distributed through the venous circulation or lymph stream, and it is very unusual for an epithelioma in this region to metastasize to any of the tissues below the clavicle. It has been my experience that if a wide excision of the epitheliomas in these regions is made at a fairly early stage in their development, a high percentage of cures is possible. Epitheliomas of the larynx respond well to surgical treatment, but carcinomas of the thyroid under ordinary circumstances are all inoperable at the time of examination. Cancer originating in the thyroid extends early to surrounding tissues and metastasizes quickly to the bone and other structures. Many are of a high grade of malignancy, and the result of surgical treatment has not, as a rule, been satisfactory.—E. Starr Judd, in J.A.M.A., Jan. 3, 1925.

Radium Treatment of Cancer: Thirty consecutive cases are made the basis of observations by F. E. Simpson (J. Radiol., January, 1925). The treatment, after preliminary surface radiation, consisted in infiltration of the tongue, under local anesthesia, with from five to thirty-eight glass ampules containing approximately 0.5 mc. of radium emanation, according to the size of the tumor.

All lesions that could be treated under direct vision healed, and none were made worse by the treatment. From three to five days after treatment, the cervical glands were given heavy surface irradiation. Of a total of thirty unselected patients, twenty are living. In sixteen cases, the apparent recovery has lasted for more than a year. In four cases, there is recurrence. One patient has been lost sight of. None of the nine patients that have died presented favorable or operable cases. Three were well for about one year, one dying from a hernia operation and two from recurrence of cancer in the neck. In three other cases, the base of the tongue was involved and the cervical glands were large and fixed. The latter condition was found in another fatal case in which the condition of the tongue was not unfavorable. This patient became deranged, refused food and died of inanition. In the eighth case, recovery had been anticipated, but the patient died from sublingual abscess two months after treatment. The advantages of the treatment are (1) there is no operative mortality, and (2) the functions of the tongue remain practically unimpaired. The disadvantages are: (1) pain accompanying the reaction, and (2) possible occurrence of hemorrhage. This may be controlled by the application of a styptic and injections of horse serum. The author concludes that the use of emanation ampules is justified in doubtfully operable and in selected inoperable cases. Cases hopelessly advanced should not be treated at all or should receive only palliative treatment as the results will not compensate for the suffering that may be caused by radium reaction. Operable cases may still have the benefits of surgical excision, although it seems that the use of the ampules combined with massive irradiation of the cervical glands will give as good and perhaps better results.

Endocrines and Preventive Dentistry: An initially perfect set of teeth of normal chemical composition and structure, in a person with normal constitution, will ordinarily require no prophylactic attention, and will last a lifetime and more. I know of numerous instances, and your experience will verify my statement, where people have never known nor used the simplest prophylaxis, and yet their dental apparatus is perfect. On the other hand, I know of others who utilize every prophylactic measure suggested by progressive dentistry and yet their teeth suffer decay and destruction. Such instances are not rare; they are common, everyday occurrences, as Chayes has already pointed out. Why does this occur? How are we to explain these phenomena? The answer is: inherited constitution and metabolic processes. These two great factors dominate the eruption, development and life of the teeth, and point out to us the true places where rational dental prophylaxis must begin, if effective results are to be obtained. These two factors, inheritance and nutrition, must receive our consideration.—Jacob Gutman, in J. Dent. Research.

Fusiform Bacilli and Spirochetes: In their eighth study of these organisms, D. J. Davis and F. B. Moorehead (J. Dent. Research, March, 1923) discuss their occurrence in alveolar abscesses. Their findings are summarized as follows: "Twenty specimens from chronic alveolar abscesses, obtained under controlled conditions, all revealed spirochetes. Pus cells were commonly found. From what is known of the relation of streptococci, fusiform bacilli and spirochetes, we would conclude that usually apical infections result from the combined activities of these three organisms. No doubt a variety of predisposing factors underlies the infectious process in alveolar abscesses."

Dietetic Suggestions in Cancer: The inhabitants of certain localities, notably the Virgin Islands and Java, are singularly free from cancer. In 5,270 hospital cases in St. Croix, fourteen showed cancer. This freedom from malignancy is ascribed in part to the simple diet, especially lacking in highly seasoned protein food. An analysis of 672 cases occurring in Egypt during the last three years revealed eight cases of cancer of stomach and only six cases of gastric ulcer. Doubtless, the simple habits and vegetarian diet of these people offer some explanation. Education with the idea of inducing Americans to eat less protein food and to precede deglutition by at least some mastication may check the rapid increase in alimentary carcinoma. Dietary precautions have some influence in the prevention of cancer. Let us not, however, conclude that some dietetic fad may accomplish the cure of carcinoma. Such groundless faith has lost to many a deluded patient the opportune moment for operation. Early removal of foci that may develop cancer must be more generally observed. The

elimination of oral sepsis and the removal of diseased tonsils is imperative. Erosions of the stomach doubtless are a starting point for ulcer and cancer; therefore, tonsils with their streptococci, should be eradicated in early life. Sane dietary habits must also be stressed. From Jan. 1 to May, 1924, seventy articles, including reviews, were published in one journal (J.A.M.A). Is it not possible that greater headway against the encroachments of this disease would be accomplished if well considered educational contributions were made to lay journals? Senior medical students must have more definite instruction about prophylaxis in and the early recognition of cancer. Hysteria in education must be avoided with the surgeon as well as the general public. As a final thought, allow me to suggest a part of the educational propaganda to laymen. A thorough annual examination for cancer should be made in every person, beginning with his fortieth year. Perhaps this may appear utopian, but one must remember that propaganda through the press has practically no limit in its possibilities.—J. D. Dunham, in J.A.M.A., Jan. 3, 1925.

Acetylene-Oxygen Anesthesia: Working from the conclusions that nitrous-oxid oxygen and acetylene-oxygen, properly administered, are equally innocuous for anesthesia, being indifferent gases that form no chemical combination with the blood or tissues, and their employment being attended with the anesthesia as speedily produced and return to consciousness as prompt, Aaron Goldman and J. D. Goldman (Dent. Outlook, February, 1925) emphasize the advantages of acetylene-oxygen as affording an increased margin of safety and assuring an absence of anoxemia, which is present in nitrous-oxid oxygen anesthesia. They add: "These considerations and others lead us to the belief that there is with acetylene-oxygen the least disturbance of the normal functioning of the organism of any known anesthetic."

Soap and Germs: Robert Koch, the discoverer of the bacillus of tuberculosis, found in the course of his investigations in 1881 that solutions of soap will kill germs. Since that time, there have been numerous scientific investigations of the subject with a view to finding out just why soaps do kill germs, the extent to which this action occurs, and the ways in which various soaps vary in this regard. During the World War, investigators in the United States Army claimed that to some extent diseases of the lungs, including common colds, and even pneumonia, were transmitted by insufficiently washing the dishes used by the men so that the next service carried the germs with it. It was proved at that time that if the dishwater contains 0.5 per cent of ordinary yellow or brown bar soap the pneumococcus which causes pneumonia, and the streptococcus, which appears to be associated with various types of infections of the nose, throat, ears and chest, as well as with various special infectious diseases, both would be eliminated. Another investigator has found that soap solutions will rapidly destroy the spiral organism that carries syphilis, perhaps through its physical effects on the organism, rather than by any chemical action. The simple character and practical nature of these facts have caused Dr. John E. Walker of the laboratory service of the Army and Navy General Hospital in Hot Springs, Ark., to undertake a new investigation of soaps as to their value in killing bacteria, and he has just made the work public through The Journal of Infectious Diseases. From a practical point of view, it is interesting to know that the organism that causes pneumonia is most susceptible of all to the various ingredients of soap, and dies very quickly under the influence of a soap solution. The streptococcus is killed, although not quite so readily, by the same soaps that kill the pneumococcus. The typhoid organism is resistant to soaps of unsaturated acids, which kill the pneumococcus and streptococcus readily, but is not quite so resistant to the soaps of saturated acids. Soaps of palmitic and stearic acids kill the pneumococcus, streptococcus and typhoid bacillus in about the same concentration.—Hygeia, February, 1925.

Announcements

CALENDAR OF MEETINGS

NATIONAL SOCIETIES

American Association of Dental Schools, March 19-21, 1925, Chicago, Illinois.

American Dental Assistants' Association, September 21-25, 1925, Louisville, Kentucky.

American Dental Association, September 21-25, 1925, Louisville, Kentucky.

American Dental Society of Europe, July 28-31, London.

American Medical Association, May 25-29, 1925, Atlantic City, New Jersey.

American Society of Orthodontists, April 14-17, 1925, Atlanta, Georgia.

Fédération Dentaire Internationale, August 2-6, 1925, Geneva, Switzerland.

New York Society of Orthodontists, March 11, 1925, New York City.

Pacific Coast Dental Conference, 1926, Portland, Oregon.

Philadelphia Dental College Alumni, April 15, 1925, Philadelphia, Pennsylvania.

Seventh International Dental Congress, August 23-27, 1926, Philadelphia, Pennsylvania.

Southwestern Society of Orthodontists, April 8-11, 1925, Tulsa, Oklahoma.

STATE SOCIETIES

District of Columbia, at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June inclusive.

National Capital at Washington, D. C., first Tuesday of every month.

March (1925)

Washington (18-21).

April (1925)

Alabama, at Mobile (6-8).
Connecticut, at Hartford (April 30-May 2).
Kansas, at Hutchinson (20-22).
Michigan, at Grand Rapids (13-15).
New Jersey, at Newark (8-11).
Oklahoma, at Oklahoma City.
Virginia, at Staunton (27-29).

May (1925)

Arkansas, at Little Rock (25-27).
California, at Oakland (25-28).
Illinois, at Peoria (12-14).
Indiana, at Indianapolis (18-21).
Iowa, at Des Moines (5-7).
Maryland, at Baltimore (4-6).
Massachusetts, at Boston (4-8).
Mississippi, at Jackson (19-21).
Missouri, at Kansas City (11-13).
Nebraska, at Omaha (third week).
New York, at Albany (13-15).
North Carolina, at Pinehurst (12-14).
North Dakota, at Fargo (5-7).
Pennsylvania, at Reading (5-7).
Tennessee, at Knoxville (5-7).
Texas, at San Antonio (19-22).
West Virginia, at Beckley (18-20).

June (1925)

Colorado, at Colorado Springs (18-20).
Maine, at Bangor (24-26).
New Mexico, at Albuquerque (20).
Oregon, at Portland (3-6).
South Dakota, at Watertown.
Southern California, at Los Angeles (29-30, July 1-2).
Utah, at Salt Lake City.
Washington, at Spokane (1).

July (1925)

Rhode Island, at Newport.
Wisconsin, at Madison (14-16).

September (1925)

Kentucky, at Louisville (18-19).

MEETINGS OF THE STATE BOARD OF DENTAL EXAMINERS

California, at San Francisco, May 9, 1925 and at Los Angeles, June 13, 1925. Secretary, O. E. Jackson.

Indiana, at Indianapolis, June 8-13, 1925, Secretary, H. C. McKittrick, 502 I.O.O.F. Bldg., Indianapolis, Indiana.

Iowa, at Iowa City, June 1, 1925. Director, H. W. Grefe, Des Moines, Iowa.

Kansas at Wichita, June 15, 1925. Secretary, George E. Burket, Kingman, Kansas.

Maine, at Augusta, June 29-July 1. Secretary, G. W. MacKay, Millinocket, Maine.

Massachusetts, at Boston, March 9-12, 1925. Secretary, J. N. Carriere.

New Jersey, at Trenton, June 29-July 3, 1925, Secretary, John C. Forsyth, 429 E. State St., Trenton, New Jersey.

Texas, Dallas, June 8-11, 1925. Secretary, R. L. Rogers, Amarillo, Texas.

ALABAMA DENTAL ASSOCIATION

The Alabama Dental Association will hold its next meeting in Mobile, Ala., April 6-8, 1925.

F. F. PERRY, *Secretary,*
Montgomery, Ala.

CALIFORNIA STATE DENTAL ASSOCIATION

The next annual meeting of the California State Dental Association will be held at the Hotel Oakland, Oakland, Calif., May 25-28, 1925.

B. FRANK GRAY, *Secretary,*
909 Hyde Street,
San Francisco, Calif.

CORRECTION IN MICHIGAN STATE DENTAL SOCIETY MEETING

The Michigan State Dental Society will meet April 13-15, 1925.

W. W. GIBSON, *President,*
Grand Rapids, Mich.

MISSISSIPPI DENTAL ASSOCIATION

The forty-ninth annual meeting of the Mississippi Dental Association will be held in Jackson, May 19-21. The officers and committeemen of 1924 were reelected for 1925 and will serve until the April meeting.

A. A. ALLEN, *Secretary,*
Amory, Miss.

THE NEW JERSEY STATE DENTAL SOCIETY

The fifty-fifth annual meeting of the New Jersey State Dental Society will be held at the Hotel Robert Treat, Newark, N. J., Wednesday, Thursday, Friday and Saturday, April 8-11, 1925.

Following is the program: "The Vital Question," by Edward C. Kirk; "Dentistry in Group Medicine; Significance of Infected Teeth and Their Surgical Treatment," by Boyd S. Gardner; "The Inferior Third Molar as a Distinct Entity," by George C. Fahy; "Radiodontic Interpretation and Diagnosis" (Illustrated), by Clarence O. Simpson.

Table and Chair Clinics will be presented by Theodore Blum, M.D., D.D.S., New York City, on "Local Anesthesia"; Charles A. Large, D.D.S., New York City, on "Various Forms of Removable Crown and Bridgework"; H. A. Maves, D.D.S., Minneapolis, Minn., on "Cast Gold Inlays and Bridges"; James S. Miller, D.D.S., Trenton, N. J., on "Balanced Occlusion in Full Dentures"; Arthur J. Norman, D.D.S., Detroit, Mich., on "A Technique for use of Porcelain Gum Enamel in Fixed and Removable Bridgework and Partial Dentures"; Clarence O. Simpson, M.D., D.D.S., St. Louis, Mo., on "Oral Radiography and Diagnosis"; Leo Stern, D.D.S., New York City, on "Local Anesthesia"; Frank Wadsworth, D.D.S., Los Angeles, Calif., on "Wadsworth Full Denture Technique"; George Winter, D.D.S., St. Louis, Mo., on "Exodontia"; and the Dental Clinic Club of Philadelphia: Frank Fox, D.D.S., Hugh McWilliams, D.D.S., on "Partial Denture Design"; M. M. DeVan, D.D.S., and Benjamin Benedict, D.D.S., on "Hall Articulator and Impression Technique; Neil's Lower Impression"; James I. Woolverton, D.D.S., and Lyman Mesimer, D.D.S., on "Tench Clasp System and Impressions; Gysi Articulator"; W. J. Robinson, D.D.S., and A. Kassab, D.D.S., on "Abutments and Bridgework; Jacket Crowns"; Albert Mulford, D.D.S., "Roach System of Removable Bridgework."

To secure accommodations, make hotel reservations early.

Exhibitors kindly address all communications to Dr. R. S. Hopkins, director of exhibits, 913 Broad St., Newark, N. J.

F. K. Heazelton, Secretary, 223 E. Hanover St., Trenton, N. J.

JOHN S. OWENS,
Chairman of Publicity Committee,
109 N. Fifth St.,
Camden, N. J.

OREGON STATE DENTAL ASSOCIATION

The annual meeting of the Oregon State Dental Association will be held at the North Pacific Dental College, Portland, Oregon, June 3-6, 1925.

Exhibitors are requested to address Dr. T. W. Anderson, 852 Morgan Building, Portland, Oregon.

FRED E. GULICK, *President,*
F. W. HOLLISTER, *Secretary,*
611 Morgan Bldg.

ANNUAL CONVENTION OF THE TEXAS STATE DENTAL SOCIETY

The Texas State Dental Society will hold its forty-fifth annual convention at San Antonio, Tuesday to Friday, May 19-22, 1925. The Gunter Hotel has been selected as headquarters, where all features of the meeting, including manufacturers' and dealers' exhibits, will be held. Exhibitors are invited to attend, and, to secure space, should address W. H. Nugent, Chairman of the Exhibit Committee, F. & M. Bank Building, Fort Worth, Texas. Members of the profession may look forward to a program of great interest, in which some of the best men from other states will take prominent parts. Visitors, on presentation of their 1925 American Dental Association cards, will be welcomed and are cordially invited to attend.

J. G. FIFE, *Sec'y-Treasurer,*
Medical Arts Building,
Dallas, Texas.

CALIFORNIA STATE BOARD OF DENTAL EXAMINERS

The next meetings of the California State Board of Dental Examiners will be held in San Francisco, commencing, May 9, 1925, and in Los Angeles, commencing June 13, and lasting until all applicants have been examined. All credentials must be in the hands of the secretary fifteen days before these dates. No reciprocity or interchanging of licenses is practiced. The examination fee is $25. Further information can be had by addressing

O. E. JACKSON, *Secretary.*

INDIANA STATE BOARD OF DENTAL EXAMINERS

The Indiana State Board of Dental Examiners will hold its next examination at the State House, Indianapolis, June 8 to 13, 1925, inclusive. For further information and application, address

H. C. MCKITTRICK, *Secretary,*
502 I. O. O. F. Bldg.,
Indianapolis, Ind.

IOWA STATE DEPARTMENT OF HEALTH

The Iowa State Board of Dental Examiners will meet at the State University of Iowa, College of Dentistry, Iowa City, June 1, 1925, at 9 a. m., for the purpose of examining applicants for a license to practice dentistry in Iowa. An examination for dental hygienists will be given. All papers and credentials must be filed with the department at least fifteen days prior to date of examination. For further information and application blanks, address the State Department of Health, Capitol Building, Des Moines, Iowa.

H. W. GREFE,
Director of Examinations and Licenses,
Des Moines, Iowa.

BOARD OF DENTAL EXAMINERS OF THE STATE OF MAINE

The Maine Board of Dental Examiners will give an examination for registration to dentists and dental hygienists, at the State House, Augusta, June 29-July 1, 1925. Applications must be filed with the secretary ten days before the examination. For information and blanks, address

G. W. MACKAY, *Secretary,*
Millinocket, Maine.

STATE BOARD OF REGISTRATION AND EXAMINATION IN DENTISTRY OF NEW JERSEY

The State Board of Registration and Examination in Dentistry of New Jersey will hold its regular examinations at Trenton, N. J., commencing June 29, 1925 and continuing for five days thereafter. The license fee is $25; reexamination fee, $10.

Practical tests required are: insertion of an approximal gold filling with the approximating tooth in position, compound approximal amalgam filling and a silicate filling for which the candidate must furnish his own patient; taking of impressions, bite, selection of teeth, articulation, trial plate; for which the candidate must also furnish his own patient; and practical examination in mouth diagnosis.

Attention is directed to the following quotation from the dental law of New Jersey: "Applicant shall present to said board a certificate from the Commissioner of Education of this State, showing that before entering a dental college he or she had obtained an academic education consisting of a four-year course of study in an approved high school or the equivalent thereof."

In accordance with this law, the secretary will issue application blanks only upon presentation of the required certificate from the Commissioner of Education, State House, Trenton, N. J.

Candidates are to be given the privilege of appearing at four examinations during a period of three years. On failure to be eligible for a license after four examinations, they shall be required to take the entire exam-

ination over and on further failure to secure a license after four more examinations during a period of three years, they shall be ineligible for further examination.

Application must be filed, complete, ten days before the date of the examinations.

Address all communications for further particulars to

JOHN C. FORSYTH, *Secretary,*
429 E. State Street,
Trenton, N. J.

THE TEXAS STATE BOARD OF DENTAL EXAMINERS

The Texas State Board of Dental Examiners will hold its next examination in Dallas, Texas, beginning June 8 and continuing through June 11. The first two days of the examination will be held at Bryan Street High School Building; the last two at Baylor Dental College. The written examinations will be in the English language in the following subjects: operative dentistry, prosthetic dentistry, chemistry, histology, pathology and bacteriology, anatomy, orthodontia, materia medica, therapeutics, oral surgery, anesthesia and physiology. The practical examination will consist of three separate operative cases and three prosthetic cases. Each applicant must furnish his own patients, also all materials and instruments. A chair will be provided. One gold foil filling, one amalgam filling and treatment such as extirpation of pulp, extraction of tooth and cleaning teeth will be required.

The board, at its discretion, may change these requirements and substitute others.

In practical prosthetics, models for a full upper and lower denture must be furnished by the applicant, together with an anatomic articulator, and mounted under the observation of the examiner, and the work continued to the point of readiness for investing. One Richmond crown and one gold shell crown shall be constructed on a natural root fitted into a plaster model, root prepared and crowns constructed under the observation of the examiner. Each applicant must bring extracted teeth for these cases, molars, bicuspids, cuspids and incisors. Separate models mounted on an articulator are required for these two cases.

Each applicant must exhibit a diploma from a reputable dental college and two letters of recommendation for satisfactory evidence of his or her good moral character; or satisfactory evidence that he or she has been regularly engaged in the legal practice of dentistry in any state in the United States for a period of three years next preceding application shall entitle one to an examination without the presentation of a diploma.

A college shall be considered reputable whose entrance requirements and course of instruction are as high as those adopted by the better class of dental colleges of the United States.

A general average of 80 per cent is required before the applicant is eligible for a license.

The examination fee of $25 must accompany all applications.

The Texas Dental Law does not provide for the issuance of a temporary license nor for reciprocity with any other state.

Applications should be in the hands of the secretary at least five days before the examination.

R. L. ROGERS, *Secretary,*
Amarillo, Texas.

ATLANTA MIDWINTER CLINIC

The Atlanta Midwinter Clinic will hold its annual meeting at the Henry Grady Hotel, Atlanta, March 12-14.

THOMAS P. HINMAN,
Atlanta, Georgia.

CHICAGO COLLEGE OF DENTAL SURGERY

The forty-second annual home coming clinic and banquet of the Alumni Association of the Chicago College of Dental Surgery will be held April 13-14, 1925.

LESTER F. CLOW, *Secretary,*
25 E. Washington St., Chicago.

PRESS REPORT REGARDING COPPER AMALGAM

The University of Toronto and the Royal College of Dental Surgeons of Ontario wish to state that they disclaim any knowledge of or responsibility for the statements recently made in the public press regarding the merits of copper amalgam as a root-canal filling, and direct attention to the regular dental professional channels for information.

AMERICAN DENTAL ASSISTANTS' ASSOCIATION

The American Dental Assistants' Association will meet in Louisville, Ky., Sept. 21-25, 1925.

JULIETTE A. SOUTHARD, *President,*
174 West Ninety-Sixth St.,
New York City.

THE DENTAL WELFARE RELIEF COMMITTEE OF JAPAN

749 Marunouchi Building, Tokyo, Japan.
December 31, 1924.

The Journal of the American Dental Assoc.,
5 North Wabash Ave.,
Chicago, Ill.

Gentlemen:

As chairman of the American and Japanese sections of "The Dental Welfare Relief Committee of Japan," we desire to submit the following report.

Owing to contributions having been received from various sources and the amounts being small, it was deemed advisable to combine them into one general dental relief fund.

Funds received were as follows:

From	
British Dental Ass'n	¥ 5,217.39
N. Y. State Dental Soc...	2,589.00
American Dental Ass'n....	1,746.84
Dr. Truman W. Brophy..	1,139.24
Los Angeles Japanese Dental Association.....	594.00
Dr. E. H. Angle.....	243.90
Mrs. J. R. Dewson (Chicago)	219.38
Interest accrued.....	141.92
Total	¥11,891.67

Dr. Brophy in making his donation specifically designated that one hundred and fifty dollars each should be donated to Drs. Chiwaki, Nakahara and Sato, presidents of the Tokyo, Nippon and Nippon University Dental Colleges respectively. Therefore after deducting this amount equalling ¥1,139.24 a balance of ¥10,752.43 was left for distribution. At the final committee meeting the distribution of the total fund was decided as follows:

For practitioners	
650 dentists in Tokyo.....	¥6,500.00
182 dentists in Kanagawa Prefecture including Yokahama.....	1,820.00
15 dentists in Chiba Prefecture	150.00
10 dentists in Shizuoka Prefecture	100.00
4 dentists in Yamanashi Prefecture.....	40.00
1 dentist in Saitama Prefecture	10.00
1 dentist in Minami Katsu Shika Gun.....	10.00
	¥8,630.00
For dental colleges	
To Tokyo Dental College....	576.08
To Nippon Dental College..	576.08
To Dental College of Nippon University	424.49
To Tokyo Women's Dental College.....	272.89
To Meika Women's Dental College.....	272.89
	¥2,122.43

The basis for distribution among the colleges was taken from the ratio of the amount of government loan to each college in proportion to their standing.

While it would have been desirable to have distributed the entire fund among the colleges or even to one institution, it seemed advisable under the circumstances not to ignore totally the dental practitioners who have lost heavily and are in a very difficult financial position and have been expectant. Therefore it was decided to donate ¥8,630.00 among 863 practitioners amounting to ¥10.00 or $3.85 each. We realize that this amount is very small to be donated to each individual. However as no partiality was shown by the Red Cross and other organizations in the distributing of similar relief funds, we deemed it best to follow their examples.

Besides this money we have received from the New York State Dental Society and the American Dental Association, twelve boxes of dental relief goods, eight of which contained mainly old magazines and periodicals, the balance containing miscellaneous old instruments and appliances, 60 per cent of which it was found impracticable to offer to practitioners, owing to the nature and condition of the articles, therefore it was decided best to distribute the contents of these twelve boxes equally among the five dental colleges.

Unfortunately the boxes were delivered at Kobe instead of at Yokohama, thereby entailing extra expenses amounting to ¥147.00 which was personally defrayed by Dr. L. E. Butler, and all other expenses were met by the Dental Federation of Japan.

Thanking you for your efforts in our behalf,

Very faithfully yours,

L. E. Butler,
Chairman of the American Section of the Dental Welfare Relief Committee of Japan.

M. Chiwaki,
Chairman of the Japanese Section of the Dental Welfare Relief Committee of Japan.

CLINIC AND DINNER OF THE ST. LOUIS STUDY CLUB OF DENTISTRY

At 2 o'clock on Saturday, March 21, 1925, at the Coronado Hotel, Spring and Lindell, the St. Louis Study Club of Dentistry will

hold its seventh annual clinic, to which every ethical dentist is invited.

This institution, organized in January, 1919, is maintained for the purpose of teaching practicing dentists the latest and most modern developments in the science of dentistry. At the conclusion of each term, a clinic is held in order to show to the profession the results achieved in each of the subjects taught.

As neither the officers nor the instructors receive compensation for their services, it is possible to conduct these classes without cost to the students.

The 126 students who were enrolled in the 1924-1925 term will participate in group clinics in the following subjects: drawing; dental roentgenology; fixed bridgework; porcelain technic; cavity preparation and casting technic; full dentures; root-canal technic; oral diagnosis and diseases of the mouth; conduction and local anesthesia; operative dentistry.

Following the clinic, a dinner, at which the members of the faculty will be the guests of honor, will be given. Ethical dentists are cordially invited to attend this function.

Bulletins descriptive of the Study Club may be had by addressing F. C. Rodgers, 309 Wall Building, St. Louis, Mo.

NEW BOOKS RECEIVED FOR THE LIBRARY OF THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

The Journal of the American Dental Association promptly acknowledges herewith the receipt of new publications. Books selected from those named on this list are reviewed below. Reviews are matter-of-fact statements of the nature and contents of the publication referred to and are intended *solely to guide possible purchasers.*

Pediatrics, by Various Authors. Edited by Isaac A. Abt, M.D., Vol. V., W. B. Saunders Co., 1924. Illustrated. Contents: Face and jaws; orthopedic surgery; tuberculosis; hereditary syphilis; infectious diseases; infection and immunity.

A Manual of Human Anatomy for Dental Students. By R. Bramble Green, M.B., B.S. (Lond.), F.R.C.S. (Eng.), Senior Demonstrator of Anatomy in the University of Durham College of Medicine, Newcastle-on-Tyne; Late Demonstrator of Anatomy in University College, London, Philadelphia: W. B. Saunders Company, 1923. Pp. 263.

According to the preface, in this work, designed for the use of dental students, the author has endeavored to combine a detailed account of the regional anatomy of the head and neck, with an elementary description of the remainder of the body by systems. In the systematic portion of the book, which constitutes Part I, detail has been eliminated and only the main facts presented.

Personal Hygiene for Nurses; Adapted Also to the Use of Students of Physical Education and Other Health Specialists. By John Wymond Miller Bunker, Ph.D., Associate Professor of Biochemistry and Physiology, Massachusetts Institute of Technology; Lecturer in Physiology, the Boston School of Physical Education; and Clair Elsmere Turner, M.A., C.P.H., Associate Professor of Biology and Public Health, Massachusetts Institute of Technology; Associate Professor of Hygiene, Tufts College Medical and Dental Schools. Illustrated. St. Louis: The C. V. Mosby Company, 1924. Pp. 189. Price $2.00.

According to the preface, the facts of hygiene contained in this volume are presented with an appreciation of the nurse's high ideals of service and in the belief that she regards the maintenance of personal health as both a fundamental duty and a matter of professional pride. The physiologic approach to these facts was chosen because, it is believed, that an appreciation of the scientific facts underlying the art of healthful living will alone lead one to develop intelligently its practical applications.

Five Lectures on the Growth of the Jaws, Normal and Abnormal, in Health and Disease. Delivered Under the Auspices of and Published by The Dental Board of the United Kingdom. London. Price, Five shillings.

The five lectures are: The Development of the Bones Around the Mouth, by Edward Fawcett, M.D., F.R.S., Dean of the Faculty of Medicine and Professor of Anatomy, University of Bristol; The Growth of the Jaws and Palate, by James C. Brash, M.C., M.A., M.D., Professor of Anatomy, University of Birmingham; The Genesis and Growth of Deformed Jaws and Palates, by James Brash; The Teeth in Relationship to the Normal and Abnormal Growth of the Jaws, by George Northcroft, O.B.E., L.D.S., (Eng.), Late President of the British Society of Orthodontics and Dental Surgeon to the London Hospital; Concerning Certain Structural Changes Which Are Taking Place in Our Jaws and Teeth, by Sir Arthur Keith, M.D., C.M., F.R.C.S., F.R.S., Conservator of Museum and Hunterian Professor, Royal College of Surgeons of England.

A Manual of Normal Histology and Organography. By Charles Hill, B.S., M.S., Ph.D., M.D., President and Professor of Anatomy, Chicago Medical School; Formerly Head of the Department of Histology and Embryology at the Northwestern University

Medical School, Chicago; Ed. 5, Thoroughly Revised. Philadelphia and London. W. B. Saunders Company, 1923. Pp. 504; with 312 illustrations. Price, $3.50.

According to the preface to the fifth edition, the general plan of the text remains unchanged. A limited amount of embryology was introduced in the first issue, and the innovation has proved so satisfactory that this feature has been enlarged upon in this edition. The new nomenclature, particularly that of the nervous system, has been brought up to date. The text has again been carefully revised and the known facts to date in elementary histology have been properly recorded.

PATENTS OF INTEREST TO DENTISTS.

1409270. Valve, Eugene W. Yearsley, Brooklyn, N. Y.

1410291. Dental flask holder, Joseph E. Gadbois, Springfield, Mass.

1410311. Dental plate filling compressor, Thomas H. Howe, Darlington, Wis.

1410130. X-ray film mount, Archibald N. Sinclair, Honolulu, Hawaii.

1411074. Adjustable easing for therapeutic application of light, Fritz. A. Anderson, Milton, Wis.

1411156. Dental impression tray, Bowen K. Bowen, Nashville, Tenn.

1411681. Dentifricial tablet, Gilderoy O. Burlew, Newark, N. J.

1411422. Lachrymatory gas, Herbert H. Dew, Midland, Mich.

1411713. Dental tool sharpener, Robert H. Downing, St. Louis Park, Minn.

1411505. Dental impression cup, Joseph K. Northwood, Washington, D. C.

1412268. Means for adjusting and securing artificial crowns and teeth in their operative position, Josiah S. Bridges, Wilmette, Ill.

1412130. Dental scaler, Thomas W. Onderdonk, New York, N. Y.

1412224. Dental clasp, Reginald V. Williams, Buffalo, N. Y.

1412843. Dental flask clamp and press, Walter J. Clark and W. M. Romine, Wichita, Kansas.

1412866. Anesthetizing machine, Jay A. Heidbrink and B. J. Clark, Minneapolis, Minn.

1412975. Syringe, Frederick W. Stanton, Chicago, Ill.

1412976. Syringe, Frederick W. Stanton, Chicago, Ill.

1413071. Dental rubber, Torrence A. Swartz, Huguenot Park, N. Y., and Edgar F. Ottmyer, Prince Bay, N. J.

1413703. Closure for hypodermic solution, Joseph F. Biehn, Chicago, Ill.

1413847. Dental connection, Henry J. Friedman, Cleveland Heights, Ohio.

1440868. Sterilizing apparatus, Victor L. Emerson, Philadelphia, Pa.

1441001. Dental casting machine, Emil Kimmig, Jersey City Heights, N. J. and S. Silver, Brooklyn, N. Y.

1440785. Toothbrush, Albert C. Levis, Chicago, Ill.

1441160. Dental X-ray package, Frank W. Lovejoy, Rochester, N. Y.

1440933. Broach, Julian L. Perkins, West Springfield, F. W. Sickles and J. Oakley, Springfield, Mass.

1440745. Apparatus for filling and closing capsules or containers, Harry V. R. Read, and R. H. Campbell, Edmonton, England.

1441396. Sanitary protector for headrests, James L. Carmony, Baltimore, Md.

1441502. Broach, Henry C. Hook, Detroit, Michigan.

1443503. Broaching tool, Henry C. Hook, Detroit, Michigan.

1442027. Chair for X-ray works, Robert Levenson, New York, N. Y.

1441817. Chin support, Frank C. McCullough, Coshocton, Ohio.

1441543. Adhesive plaster spool, Wm. A. Tainsh, Chicago, Ill.

1441384. Sanitary suction for artificial dentures, Jacob A. Thomas and R. S. Thomas, Washington, D. C.

1441257. Artificial denture and tooth therefor, James L. Williams, New York, N. Y.

1442380. Floss holder for dental use, Louise C. Ball, New York, N. Y.

1442465. Dental apparatus, Martin F. Burns, Astoria, N. Y.

1442253. Inhaling apparatus, Daniel R. Cooper, Gore, New Zealand.

1442081. Mount for artificial teeth, Frederick Maculen and C. L. Van Allen, Newark, N. J.

1442440. Collapsible foil tube. Isadore Messinger, Rochester, N. Y.

1442362. Toothbrush, Alexander Saxe, New York, N. Y.

1442363. Toothbrush, Alexander Saxe, New York, N. Y.

1442303. Rotary toothbrush, Morris C. Sloan, Chicago, Ill.

1443079. Dental Disk holder, Rene Lefebvre, Berne, and A. Ramseier, Neuchatel, Switzerland.

1443034. Root extractor, Ransom E. Oles, Lansing, Michigan.

1443470. Syringe-handle forming machine, Hans N. Haiversen, Vineland, N. J.

Copies of the above listed patents may be obtained for 25 cents each, by addressing John A. Saul, Solicitor of Patents, Fendall Building, Washington, D. C.

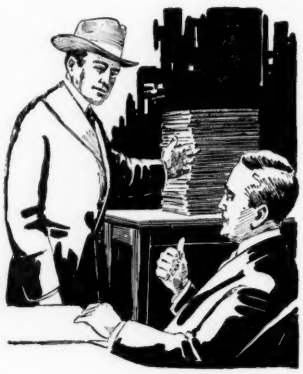
The Dentist's Guide to Buying

By Ernest V. Madison

IN a manufacturer's private office, on a table near his desk, was a neatly arranged pile of the back numbers of a business paper.

A caller's curiosity was aroused. "Why do you keep those old magazines?" he asked; "you do not read them more than once, do you?"

"That pile of magazines is my buying guide," the manufacturer replied. "I am, as you know, a busy man, kept on the job most of my time in my building; but the advertising pages of this magazine keep me in touch with the outside activities of my business field — with the progress in design and manufacturing of equipment, materials and supplies suitable for my plant."



"But doesn't the reading of these advertisements take a lot of your time?" the caller asked.

"On the contrary," was the answer; "it saves me time in the long run. By taking each new copy home and reading it in the evenings, I get a good idea of recent developments in our field. After I have finished this reading, I bring the copy to the office and place it on that pile, where it remains until I am in the market for something. Then I take up these magazines and read in the advertising pages what the manufacturers say about their products. I form an idea of what I want and give time only to the firms whose products are more likely to interest me. In this way, a careful reading of the advertisements saves me time and in many instances real money."

* * * * *

Is there not a thought here for the readers of all publications carrying advertising—or more specifically for the readers of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION? If we save and file our copies of this magazine, we have a buying guide which cannot be duplicated.

The days are coming when we will want to buy. It will then be a simple matter to turn to the advertising section of the saved copies, and address our inquiries to those who seem to have what we want and within our price range.